The Engineering and Mining Journal

VOL. LXXXII. NEW YORK, DECEMBER 8, 1906. NO. 23.

ASSAY OF BULLION CONTAINING SELENIUM

Notes on the Determination of Products That Have Been Considered Difficult

BY J. E. CLENNELL

As it is usually supposed that there is difficulty in eliminating the last traces of selenium from gold and silver bullion, and as its presence would introduce inaccuracy in the assay of such bullion, the following notes on the methods adopted in sampling and assaying bullion at the Redjang Lebong mine, Sumatra, may be of interest.

Selenium occurs originally, as is supposed, as a selenide of silver, dissolves in the cyanide solutions as selenocyanide (Na Se CN) and is precipitated in the zinc boxes together with gold, silver, lead and a small quantity of copper. The precipitate is treated with sulphuric acid and roasted before smelting, much selenium being eliminated in these processes.

A sublimate, consisting of almost pure selenium dioxide, has been observed outside the smelting retorts. The bullion finally contains from 1 to 2 per cent. of selenium, and in some cases, particularly with "shorts" bars, a matte consisting essentially of selenide of silver rises to the surface during the smelting and sometimes forms a black crust on the bars after casting. The "shorts" bars contain less selenium but more of the base metals than the bars produced from fine precipitate. Exclusive of matte, the bullion is fairly homogeneous—drill samples, dip samples and chippings from various parts of the bar generally agreeing very closely.

SAMPLING

The following details with regard to the methods employed have been kindly furnished by A. Yates, the metallurgist in charge of the cyanide plant:

"Drill samples are taken with a small vertical machine drill running at 1680 r.p.m. Four holes (5/64 in. in diam. by 2 in. deep) are made in each bar, Two of these are on the upper face parallel to a long side and 1 in. from the edge, the first hole being 1 in. from one end and the second about 3 in. from the first. The other two are in corresponding positions on the bottom of the bar, near the diagonally opposite corner and edge.

"Dip samples are taken before pouring the metal. The bath of metal is first well rabbled with a rabbling iron and a small plumbago spoon is then dipped in, being held by the tongs, the metal being covered with a thin layer of slag. The dip sample is poured into a dish of water to granulate it. The bars average about 600 oz. (troy) in weight and have a thickness of about 3⅜ in. from top to bottom. The upper face measures 9x4 in. and the lower 8⅛x3¼ inches."

PREPARATION FOR ASSAY OR ANALYSIS

Drill samples are spread out on a sheet of paper and any particles of slag, etc., are picked out. In some cases it may be necesary to cut the larger cuttings into smaller pieces, or the whole sample may be reduced to a somewhat finer state of division by grinding in an agate mortar.

Dip samples are flattened by hammering on a clean anvil, the slag is removed and any matte on the surface is scraped off. The pieces are then cut up with scissors.

GOLD AND SILVER ASSAY

Weighing in—The sample is spread out before the balance and 500 mg. taken by selecting small portions from all parts of the heap; this amount is weighed within 0.05 mg. on the fine assay balance. It is then swept from the balance pan by means of a fine brush into a conical and spirally coiled packet of lead foil, which weighs about 5 g. This is then folded up so that the bullion is securely inclosed, forming a rounded pocket without projecting angles. This is placed in a porcelain crucible together with another packet containing 10 g. of pure lead, hammered out into a convenient shape for cupellation. The total amount of lead used for each weighed portion of 500 mg. of bullion is adjusted roughly to 15 grams.

Checks—These are of "proof" gold and silver obtained from Messrs. Johnson and Matthey, of London. The metals are rolled out by bullion rolls to a convenient thickness for cutting with scissors, cleaned if necessary by immersion in dilute hydrochloric acid, washed and dried.

The amount of gold judged to be present in 500 mg. of the bullion to be assayed is then weighed out. When this is not approximately known a preliminary assay (without check) is made on the bullion. The gold for the check is adjusted to within 0.5 mg. of the amount theoretically required, the exact weight of this quantity is then determined to 0.01 mg. and introduced into a 5-g. lead packet. The amount of silver judged to be present in 500 mg. of the bullion is then weighed, together with an additional quantity to allow for loss by volatilization and absorption in the muffle; this extra amount depends upon the position the assays are to occupy in cupellation and the temperature at which this operation is carried out. The extra silver required is roughly as follows:

	With Morganite. No. 5 Cupels.	With Bone Ash. No. 5 Cupels.
1st (back) row.	6 to 8 mg.	11 to 14 mg.
2nd (back) row.....	5 to 7 mg.	9 to 12 mg.
3rd row.....	4 to 6 mg.	7 to 10 mg.
4th (front) row.....	3 to 5 mg.	5 to 8 mg.

The silver is adjusted to within 2 mg. of the amount theoretically required and the exact weight then determined to 0.02 mg. It is then added to the same packet in which the weighed quantity of gold was placed, the whole rolled up and placed in a porcelain crucible, together with 10 g. of pure lead in a separate packet.

Experiments have shown that the addition to the checks of quantities of selenium, copper and zinc, in amounts corresponding to those present in the bullion, does not perceptibly affect the result.

Position of Checks—The assays are generally cupeled in batches of 12, in 4 rows of 3 each. Every row consists of duplicate assays from one bullion bar, and the corresponding check. In order to equalize the effects of any possible difference of temperature in various parts of the muffle, the position of the checks in each row is varied in different batches of assays, one of the following arrangements being usually adopted.

A			B			C			D		
	1	1	1		1	1	1		1		1
2		2		2	2	2		2	1	2	
3	3		3		3		3	3	3		3
4		4	4	4		4		4		4	4

Experiments with blank charges consisting of known weights of pure gold and silver, wrapped in lead foil, showed that the losses of silver were slightly less in the central line of the muffle than at the sides, and considerably less in the front row than in the three others, which differed but little among themselves, though the back row showed the greatest loss.

Cupellation—The procedure adopted

calls for no special comment. Morganite No. 5 cupels are found suitable. Charcoal is used for fuel, care being taken to fill the furnace well up and distribute as evenly as possible, to secure uniform heat. The cupels are heated by themselves for a few minutes, then the blocks of pure lead are introduced, and when these are cupeling freely, the packets containing the bullion or checks are dropped carefully into the corresponding cupels, where they are at once absorbed in the bath of molten lead. A moderate but sufficient temperature is maintained throughout, and the door closed toward the end of the operation, which usually lasts about half an hour. When cupellation is apparently complete, the cupels are drawn to the mouth of the muffle and allowed to stand until "brightening" has taken place and the buttons have solidified. They are then replaced on the tray in their proper positions, the beads nearly always showing a perfectly bright smooth surface, without signs of "sprouting," or detached particles appearing on other parts of the cupel.

FLATTENING, ROLLING AND WEIGHING OF FINE METAL

The beads are detached from the cupels by means of pliers. They are then held in steel forceps with the edge of the bead uppermost and struck once or twice on a smooth anvil with a smooth-faced steel hammer. The rough surface (where the bead was in contact with the cupel) can now be easily cleaned with the wire scratch-brush and the bead then beaten out to about 1 cm. diameter. The beads are then weighed on the assay balance to 0.02 mg. and recorded as gold and silver.

For ordinary assays of cyanide bullion, the results obtained are identical whether the beads are simply flattened, as described, or whether they are rolled, as is usually done, between steel rolls. For larger beads, such as those obtained in the assay of mill bullion, it is better to roll out after weighing. The beads are annealed by holding with the forceps for a few moments in a spirit flame, then passed through the rolls, which are loosened to allow the metal to pass through without much force. This is repeated several times, gradually tightening the rolls by about a quarter of a turn each time until a strip about 3 in. long is obtained, the edges of which should be smooth and free from cracks. These ribbons are then annealed by passing through the spirit flame, and loosely rolled up.

The cyanide bullion produced here invariably contains sufficient silver for parting; the beads from the mill bars, however, must be re-cupeled with the addition, usually, of 600 mg. pure silver.

PARTING

The rolled or flattened beads are placed in porcelain crucibles 4½ cm. in diam. by 3 cm. deep, supported on a perforated plate over an oil stove, and 15 cc. of "weak" acid poured over each. The weak acid is prepared by diluting 1 part of pure nitric acid (sp.gr. 1.42) with 7 parts of water and, therefore, contains 12.5 per cent. of concentrated acid. After the cornets have been well boiled, the lamp is turned down, the acid being kept hot but not actually boiling, for say 15 minutes, after which the liquid is again boiled till quite colorless, and until the bubbles given off no longer show the slightest appearance of brown fumes. If on cooling for a moment, a rapid evolution of small bubbles still takes place, the boiling is further continued, but usually about 20 minutes' treatment in the weak acid is sufficient. The acid is then drained off and replaced by 15 cc. of "strong" acid. This is prepared by mixing 3 volumes of nitric acid (sp.gr. 1.42) with 1 volume of water. The liquid is raised cautiously to the boiling point, when the lamp is turned down, for say 25 minutes, thus keeping the crucibles hot but not actually boiling, and adding fresh acid if necessary. At the finish the temperature is again raised to the boiling point. The time allowed for strong-acid treatment is usually about 30 minutes.

Evaporation to dryness must be carefully avoided, especially during the weak-acid treatment, for if the cornets are heated sufficiently at that stage to cause them to acquire a natural gold color it is afterward impossible to extract the residual silver by the strong nitric acid treatment, and the result will be too high. For good results it is necessary to boil thoroughly in both acids.

On adding fresh quantities of cold acid or water it is frequently observed that a purplish color develops, which, however, disappears on boiling, leaving a slight blackish scum. This may possibly be due to gold being dissolved by the presence of a trace of nitrous acid (the acid used contains no chlorides). On dilution this dissolved gold is precipitated in a finely divided condition and collects together in a denser form on boiling. This occurs both with checks and bar samples, so it is not the result of any impurity of the bullion retained after cupellation.

By the treatment above described, beads containing originally 60 to 80 mg. of gold and 350 to 420 mg. of silver usually remain unbroken. When the proportion of silver is much larger they break to pieces, and some care is necessary to avoid loss. Too violent boiling must also be carefully guarded against, which is liable to cause spurting, especially during the strong-acid treatment, and may result in the cornet suddenly breaking to pieces, in which case fragments are likely to be projected out of the crucible.

WASHING AND IGNITING

After pouring off the strong acid, the cornets are washed and the inside surface of the crucible carefully rinsed out twice with distilled water. The crucibles are then replaced on the perforated frame over the lamp and allowed to dry for a few minutes at a moderate heat. They are then ignited by being placed for a minute or so in the muffle, or by heating on a benzine blast lamp until they acquire a bright golden color.

TESTS OF PURITY OF THE CORNETS

It has been suggested that selenium may be retained in the cornets even after cupellation, parting with nitric acid and ignition in the manner described. T. Akitt, formerly chemist for this company and now at Lebong Soelit, informs me that he at one time observed a reddish sublimate on the sides of the crucibles during the ignition of the cornets, which proved to be selenium, and was accordingly led to adopt the somewhat high proportion (30:1) of lead used in the cupellation, which is still employed here. No such sublimate has been noticed by the writer up to the present time. However, the liquor from the nitric acid treatment, containing the dissolved silver, was examined on one occasion and found to contain traces of copper and selenium, but the amounts were too small to affect appreciably the correctness of the assay.

On several occasions the cornets have been dissolved in aqua regia, and after settling in dilute solution, the clear liquid decanted from a small residue of silver chloride has been precipitated with ferrous sulphate. The precipitated gold was filtered off, after standing for several days, and the filtrate boiled with hydrochloric acid. They were then evaporated on the water-bath, the dry residue again taken up with HCl, filtered and heated for some time with the addition of sodium bisulphite, but no indications of selenium were found.

TIME OF PARTING

The time usually occupied by the various operations is approximately as follows, for a batch of 12 assays: Treatment with weak (12.5 per cent.) acid, 20 minutes; pouring off weak acid and replacing by strong, 5 minutes; treatment with strong (75 per cent.) acid, 30 minutes; pouring off, washing and drying, 10 minutes; igniting on blast lamp, 10 minutes, thus giving a total of 75 minutes.

WEIGHING GOLD CORNETS

When cool, the gold cornets are weighed to 0.01 mg. on an assay balance capable of indicating 0.005 mg. The cornets must be perfectly clean and of a gold color. If pale they probably contain considerable undissolved silver.

The adjustment of the balance is checked before beginning each batch of weighings, and frequently during the course of the work, but generally after every three weighings. Any slight variation is corrected by moving the rider on the left arm of the beam, so that the instrument is not disturbed or heated as would be the case if the vane were

moved. The latter is so arranged that the right arm of the beam is kept permanently 0.1 to 0.3 mg. heavier than the left.

It is necessary carefully to examine the weights used and to determine their true value with reference to the 500-mg. weight used for weighing in, as the sets supplied even by firms of high standing are by no means absolutely correct.

INTERPRETATION OF RESULTS

The fineness of the bullion is reported in parts per 1000. As 500 mg. are taken for each assay, it is merely necessary to multiply the result by 2 to obtain the fineness. A correction requires to be made, however, for losses of gold and silver in cupellation and for silver retained in the cornets after parting.

In the gold assay the weight actually obtained is the net result of the loss in the first operation and again in the second. It is assumed that the fine gold used in the check has undergone the same losses and gains as that from the bar. Hence if the check has increased in weight, the amount of this increase is deducted from the weight of gold obtained from the bars adjoining that particular check in the muffle; if the check has diminished, the amount of such decrease is added to the weight of gold from the bar.

Under normal conditions the silver always shows a loss, so that the correction indicated by the check has to be added to the silver found. It occasionally happens that the front row in the muffle will show an apparent increase in silver; this is due to retention of lead; in such cases the correction cannot be safely applied and the assays are always repeated, using a somewhat higher temperature.

The following example illustrates the method, 500 mg. taken in duplicate, for assay of bar:

	Gold. mg.	Silver. mg.
Taken for check	76 79	399.59
Found	76.88	391.97
Difference	—.09	+5.62

	Bar. (a)	Check.	Bar. (b)
Fine metal found	468.50	468 85	469.44
Gold found	76.70	76.88	76.68
Silver found	391.80	391.97	392.76

	(a)	(b)	
Fineness of Gold	76.70	76.68	Mean 76.60 or 153.20 parts per 1000.
	—.09	—.09	
	76.61	76.59	
Fineness of Silver	391.80	392.76	Mean 397.90 or 795.80 parts per 1000.
	+5 62	+5.62	
	397.42	398.38	

CONCLUDING REMARKS

The method herein described does not differ in any essential respect from the ordinary routine method of bullion assaying. We may, therefore, conclude that such small amounts of selenium as are here present do not appreciably affect the correctness of the assay.

If larger quantities were habitually present it would probably be necessary to add a certain amount of pure selenium to the checks, but hitherto the checks of pure gold and silver have been found to behave during cupellation and parting precisely in the same way as the bullion assays themselves, showing that the impurities have little or no influence on the result.

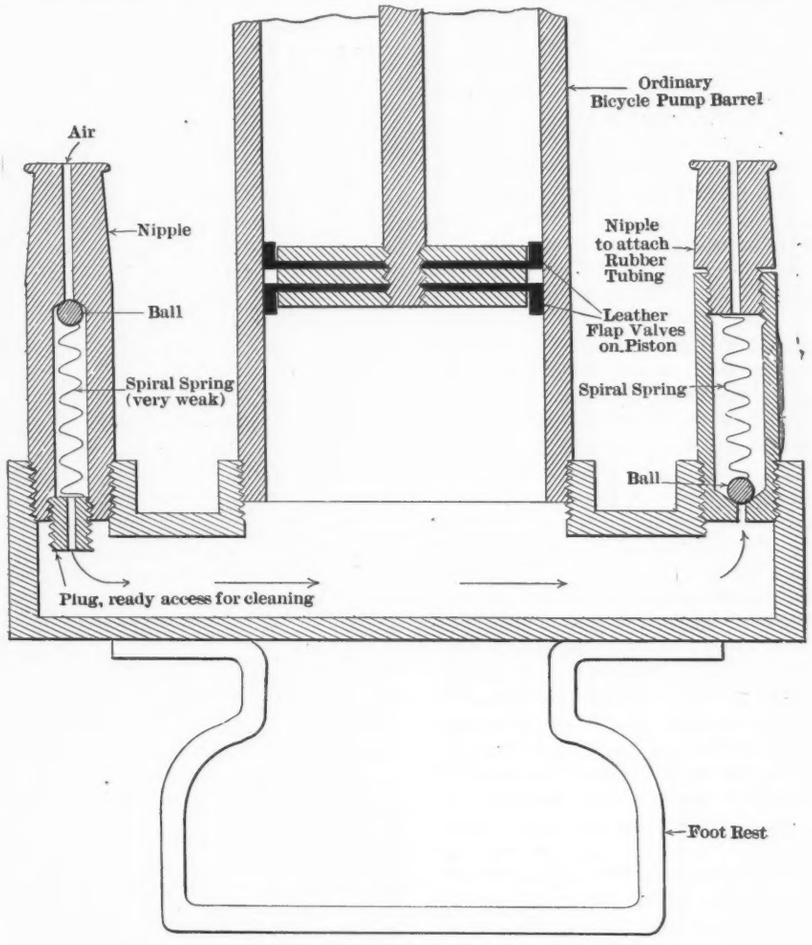
A Gas Pump for Hot Gases

BY CLAUDE T. RICE.

When the chemists began to investigate the smoke question at the Salt Lake smelters, considerable trouble was experienced in obtaining samples because of the dusty nature of the gas and its high temperature. Several pumps were tried. Finally H. E. Benedict, working on the smoke question at the United States smelter at West Jordan, modified the valve arrangement of an ordinary bicycle pump as shown in the accompanying sketch. This pump has proved very satisfactory.

Leather valves are used because of the rapid deterioration of the rubber ones. A double valve is used on the piston so as to make it air tight both on the up and the down stroke. Little trouble is experienced with the clogging up of the air valves, but on account of the dust from the gases, the balls of the valve have to be cleaned about once in four or five days. The valve is simple and can be made by any mechanic. Ordinary bicycle balls are used in it. The piston valves are kept well oiled with vaseline. The air valves can be readily inspected. The spiral spring is made very weak. It is simply made by winding a small wire around a pencil.

Before using, the pump is tested for back leak. Any leak is easily remedied by taking out valve nipple and then the valve plug and cleaning the ball of the hard layer of dust which may have accumulated.



ARRANGEMENT OF VALVES IN HOT-AIR PUMP

In a paper on the early history of mining in the Danube countries, in *Der Erzbergbau,* Nov. 1, 1906, Dr. F. Freise states Roman smelting crucibles and iron slags have been found at Mels and Vilters, showing that the Gonzen iron mines at Vilters, which were worked throughout the Middle Ages, date back to the earliest times. The iron mines of Noricum were much more considerable in Roman times. Even Homer was acquainted with the Noric steel. Noric steel served as a symbol of strength and hardness, and was preferred to all other steels.

Shaft Sinking at Cinderella Deeep

BY A. M'A. JOHNSTON.*

The shaft of the Cinderella Deep reached a stage well within touch of the reef last February. It is interesting to note the means adopted in sinking, the rate of sinking, and the costs. Started prior to the war, and resumed again in the early part of 1902, the shaft attained in February, 1906, a depth of 3900 ft., and is the second deepest mine on the Rand at the present time. It was computed at the time of starting that the reef would be found approximately 3000 ft. from the bank; but owing to some cause not yet ascertained, 3900 ft. were sunk without intersecting reef matter. At that depth, a bore-hole was started to find whether the reef was still underneath, and after boring 113 ft., at an angle of 45 deg. from the shaft toward the reef, the orebody was struck, 72 in. wide, and assaying over an ounce to the short ton. Hence the completed shaft will be 4060 ft. in depth. The formation cut through did not present any special features, the ordinary quartzite of the Rand being the chief rock, and no hard dikes of any considerable size had to be penetrated. Water inconvenienced the work very little. Consequently the rate of progress—90 ft. per month—is by no means a great record.

The shaft is a five-compartment one. Four compartments measure 5x6 ft. inside the timbers, and the other 6x6½ ft. inside. The last is used for ventilation, and is boarded up to within 400 ft. of the bottom. No hindrance was caused owing to insufficient ventilation, as the men were able to start work again 15 minutes after blasting, and the temperature did not inconvenience the men in any way. For hoisting, buckets were used, being preferred to skips. Tests were made to determine the various rates of progress by using four, six and eight machines, and also to reckon out the comparative costs. When four machines fixed on two bars were used, three white men were employed, one to assist the others, and to superintend the colored labor, shifting the broken rock and drilling a few extra holes or easers. The method of working adopted was the sump and bench style, and in this way 99 ft. per month were averaged. With six machines on three bars four white men were employed and a few extra "boys," but it was found that the footage was very little improved by this method. Three-quarters of the shaft was drilled over by machines before blasting, and any holes in addition, to help these, were put in by hand labor. Eight machines were then tried. These were placed on four bars, and six white men were in charge, but no hand drilling was employed, the whole bottom being drilled over with the machines. This system was in vogue for only two weeks, but the rate attained was 138 ft. per month.

When working the four machines the charges were: Labor, explosives and stores, $33.38 per ft.; cleaning up and haulage hoisting, $21.26; total, $54.64. The cost of working the six machines was slightly more, and as no counterbalancing advantage in footage was gained, this system was soon discarded. The charges against the eight machines come out as follows: Labor, explosives and stores, $36.66 per ft.; cleaning and hauling, $22.72; total, $59.38.

With four machines the time taken to blast the whole bottom and clean up was 57 hours, while with eight machines the time was 42 hours. An advantage gained by the four machines was in the quickness with which the machines could be set up, the bench forming the first point of attack. Also the holes invariably broke to the bottom, and it was reckoned that the four-machine method was safer and did better work, the advantage of the hand labor being apparent in squaring up and assisting the machines. It was found also, when working the eight machines, that four buckets were required for hoisting, thus bringing into use two engines. Unfortunately these four buckets could not be kept going all the time, and so the loss incurred through the temporary hanging up of one of the buckets counterbalanced the previous advantage gained. On the other hand, the increased rate of sinking—an increase of nearly 50 per cent.—is greatly in favor of the use of eight machines, as this involves a more speedy return on the capital invested, and in addition a not inconsiderable saving in administration expenses.

It is instructive to note the varying cost rate of sinking estimated every 1000 ft. These figures include the cost of timbering, the bratticing of the ventilation gangway, and all maintenance and office charges. The figures are as follows:

From 1 to 1000 ft	$87.08 per ft.
From 1000 to 2000 ft	95.28 per ft.
From 2000 to 3000 ft	109.32 per ft.
From 3000 to 3900 ft	126.10 per ft.
An average of	$103.89 per ft.

The complete equipment, inclusive of sinking and timbering up to the depth of 3900 ft., averaged $168 dollars per ft., or a total sum of $655,200, the spending of which sum shows the confidence the Rand financiers and engineers have in the possibilities of deep-level undertakings.

The Gold Stealing Commission of Western Australia, having concluded the taking of evidence, is now considering its report, but it will not be completed until inquiries have been instituted in Adelaide and Melbourne with respect to the nature of ore- and gold-selling transactions undertaken by Western Australian dealers in gold with the Melbourne mint and the proprietors of smelting works and gold-buyers in South Australia and Victoria.

The Sicilian Sulphur Situation

Mesrs. Emil Fog & Sons write from Messina, Sicily, under date of Oct. 31, as follows: "The dispute regarding quotations between Catania and Girgenti was resolved in favor of the former. When this news became known at Girgenti, quite a riot broke out. The railway cars with sulphur were burnt, and other disorders occurred; order was restored by soldiers. The refineries at Girgenti henceforward will work at a disadvantage, and probably be obliged to close. On the other hand many mines, owing to the lower prices which the brimstone brings at Catania, will prefer sending their brimstone to Girgenti, the entries at Catania will diminish, and it is not at all improbable that in the spring, when the consumption of the refineries and mills at Catania is enormous, the supply may fall short. With reference to contracts closed previous to the establishment of the Consorzio Obbligatorio, the brimstone will remain subject to the rules of the Consorzio. A court of arbitration will decide whether for account of sellers or buyers. A bona fide contract ought to be respected in all its parts, and the above decision is hardly fair. It causes great annoyance and loss to merchants having previous engagements. As stated before, prices were increased about 50c. at Girgenti, but left unaltered at Catania. It is believed the Consorzio will continue to raise quotations."

The Rosebud District, Nevada

A rush has set in from Salt Lake to the Rosebud district. About six months ago some local miners started development work on some prominent vein outcrops on the Powhattan mine and the results being highly satisfactory, other miners were induced to locate and develop adjoining claims. Recently the Rooklidge Brothers, of Salt Lake, visited the field and secured options over the Powhattan and Brown Palace groups. Seven valuable strikes have been made to date, within a radius of five miles, in this new district. The new town comprises fifteen or twenty tents and by Christmas it is expected there will be a large number of people on the ground. The route into the district is via Mill City, which is the only place where transportation may be secured. Within a few days, however, it is expected that a daily stage will be running from Humboldt House, which is several miles closer to the camp.

The great advance in prices of most metals, and especially of copper, has drawn attention to the mines of Corsica. A company has been formed in Paris to work several lodes which have never been thoroughly prospected, and a smelter is in course of erection for the production of matte.

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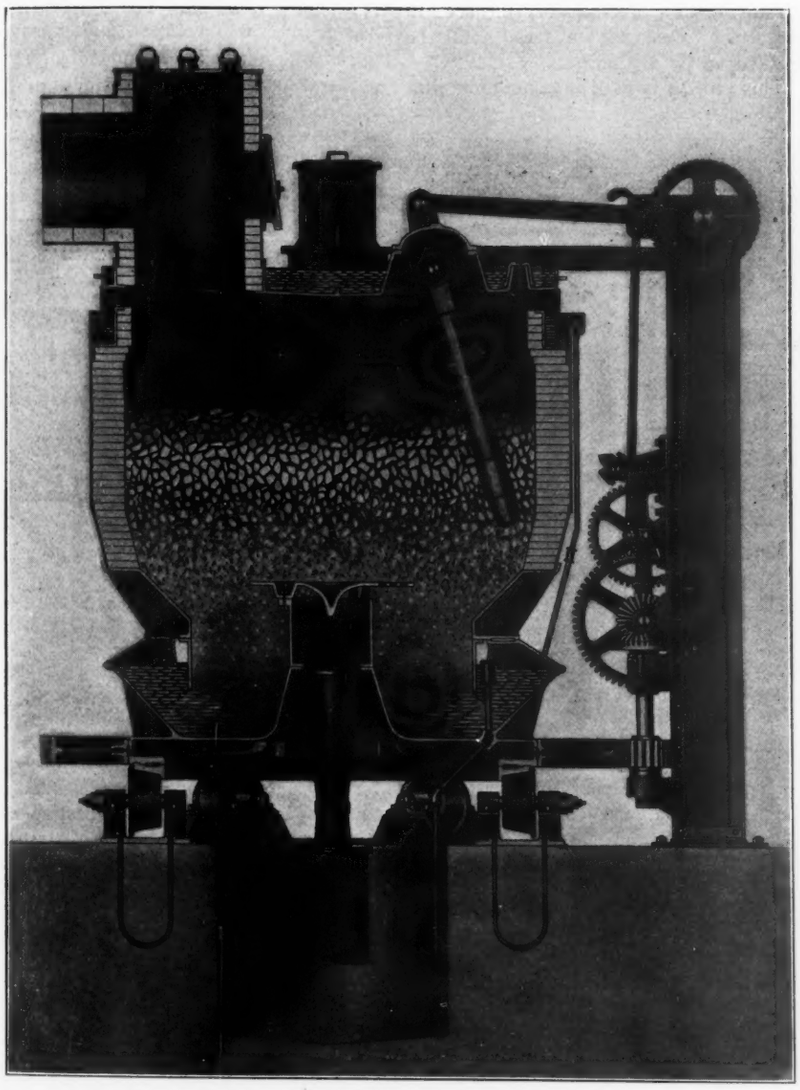
The Hughes Gas Producer

The special feature of this producer, which is built by the Wellman-Seaver-Morgan Company, of Cleveland, Ohio, is the mechanical poker, which is a water-cooled steel casing, suspended from a trunnion. The poker is operated by ratchet gearing actuated by a crank and crank shaft, driven by gearing connected with the main shaft. This mechanism moves the poker back and forth in the coal. Thus hand poking is eliminated. The uniform treatment secured by the mechanical poker, it is stated, has proved highly beneficial, giving better results as to quality, quantity and supply of gas, and thus reducing the size of plant required for a given capacity.



SECTIONAL VIEW OF HUGHES GAS PRODUCER

Under average conditions it is stated that the mechanically poked producer will gasify 25 lb. per hour of coal per square foot of producer area, and frequently as high as 30 lb. The standard size of the producer is 10 ft. diameter inside of the firebrick lining.

The main shaft and gearing are supported by steel framework securely braced to the top of the producer. The producer shell is of steel plate and is secured to a cast-iron base ring, to which is bolted a cast-iron water seal forming an ash receptacle. The base ring rests upon supporting columns bolted to a cast-iron revolving turn table, which as it turns rotates with it the body of the producer and the ash pan.

The bottom of the turn table is fitted with a steel tread resting on conical carrying wheels and supported by the necessary axles and boxes. As the producer shell revolves, the ashes work down into the ash pan. The producer top is a steel casting flanged and ribbed to provide for water cooling, a water seal being formed by a top flange at the outer circumference of the producer cover. The use of a steel casting for the producer top adds materially to its durability, as experience has demonstrated that where parts are exposed to the heat, steel castings are superior to cast iron and decrease the expense for repairs.

The producer top is equipped with two feed hoppers fitted with counter-balanced bells and gas-tight swing covers. These hoppers are located at different distances from the circumference of producer top, and deposit the coal in concentric rings as the producer top revolves. To the top of producer is attached the gas outlet, provided with cleaning door, observation holes, etc., and having a short flanged neck to which connection from the gas outlet to gas flue may be made.

Three horse-power is required to operate a single producer. The labor required is, of course, somewhat dependent upon the arrangement of the plant and the facilities for coal and ash handling. In plants where the coal is delivered overhead into bins and fed to the producer by a hopper or other mechanical devices, six men per shift are ordinarily sufficient to operate eight producers.

As regards the quality of gas produced from bituminous coal, it is stated that repeated tests show uniform results, many of these tests showing between 3 and 4 per cent. CO_2, and from 26 to 28 per cent. CO.

A Process for Oxidizing Metallic Sulphides in Ores

BY N. LEBEDEFF AND B. POMERANZOFF*

The process to be described is one for oxidizing metallic sulphides, the end aimed at being the preparation of ores which contain sulphides for final treatment by wet or dry means, so that the metal may be extracted. The method is essentially as follows: The crushed ore is mixed with clay and the whole mass is submitted to the gradual action of heated air at a temperature of 300 to 400 deg. C. As the oxidation of the sulphur proceeds very energetically when the clay used contains much iron, it must be admitted that in this case the oxidation is not due so much to the direct penetration of air into the charge as it is to oxide of iron in the clay.

In order for the process to go on successfully, the quantity of oygxen absorbed by the surface of the charge should be equal to the quantity transmitted in the same time to the interior of the mass. This result can be secured by regulating the amount of air supplied, and its temperature. If these conditions are not fulfilled, there is formed on the surface a layer of oxide which cannot absorb oxygen, and the process stops gradually, leaving within the mass a core of unoxidized sulphides.

In order to demonstrate the influence of clay upon the oxidation of sulphides and in order better to show the difference between the method in question and the old

* Oranienbaum, Russia.

method (calcining), the following experiment was carried out. A piece of copper matte was placed in a stream of air which was heated to about 400 deg. C. Alongside of the matte was a briquet made of some of the same matte, crushed and mixed with clay. After 24 hours, the piece of matte showed only traces of superficial oxidation, while the briquet was almost entirely oxidized. There remained unoxidized only a small core in the middle of the briquet.

Thus the essential point of this new process is the possibility of the complete oxidation of metallic sulphides by submitting them for a certain time to the action of heated air. This time is much shorter than that required in calcining, and moreover the temperature required is not sufficient to change the sulphides if they have not been mixed with clay.

In order to carry out this process in practice, simple sheds may be used for roasting and the air heated by some special device. It is, however, more economical to make use of the heat retained by cinders and furnace refuse, brought into the shed by a truck.

When the ultimate destination of the charge is not a blast furnace, but a reverberatory furnace whose flame carries considerable oxygen, the mixture can be used without previously drying it and without briquetting it. In this case the clay gives such fusibility to the charge that a considerable saving in fuel results, even though the charge has been greatly increased in bulk.

The amount of clay used varies according to its quality and according to the quantity of sulphides in the ore. On the average there is used one volume of clay to one volume of ore.

It is understood that oftentimes clay is used to cement ores before they are calcined. But the limited amount of clay so used cannot have any effect on the oxidation and so there can be no objections to the originality of the claims of the new process.

To sum up: This is a process of oxidizing metallic sulphides contained in ores and consist in mixing ground ore with clay in proper proportions and submitting the whole mass to the gradual heating effect of a current of warm air. The mass may be treated loose, or in briquetted form, in a special form of apparatus, or in a reverberatory furnace. In the latter case the material will be worked up by dry means.

This process is used in connection with the smelting of copper ores at Nijni Tagilsk, Russia, the results of which were communicated in the JOURNAL of April 21, 1906. The conditions at Nijni-Tagilsk were favorable to the introduction of the process, inasmuch as the ore itself contained more clay than was necessary, so that it was profitable to smelt it without any addition of that material. The only unfavorable condition was the presence in the ore of about 1.5 per cent. of oxide of copper, which passed into the clay and occasioned a loss of time for its reduction.

FIG. 1. DRYER FOR MANUFACTURE OF PLASTER OF PARIS

A considerable production of sapphires is made at Anakie, Queensland. According to a local paper, the most noteworthy stone found recently was of a green color, weighing 400 carats. Another, which appeared to be of an inferior quality, was purchased from a miner by a dealer, who had the exterior removed by the process known as "slabbing" and disclosed a beautiful yellow gem of 125 carats—the largest yellow yet obtained on the field, and possessing a wonderful luster and rich coloring.

Clay and Cement in Mississippi

During the past summer Director A. F. Crider, Dr. W. N. Logan of the Agricultural and Mechanical College, and Dr. Calvin S. Brown of the State University, members of the Mississippi Geological Survey, have been investigating cement materials and clays, which are considered of the greatest importance at present to the people of the State, and reports on them are now being prepared for publication. Not until a very recent date was it known that Mississippi possessed the raw products for the manufacture of portland cement. In the study of the various materials the director visited 31 counties and made a representative collection of samples of cement limestone, clays and marls, which have been turned over to the chemist for analysis. The report on them will include a discussion of the methods of cement manufacture, the location and the amount of material and chemical analysis and tests of the products.

The survey has also noted with great interest the success of making roads with burned clay, and will take up the question of road-building clays. In concluding his report Director Crider recommends the publication of a large geological map of the State, the selection of a chemist, the disposition of surplus funds remaining in the treasury and the cooperation of the State Survey with the United States Geological Survey.

At Mount Bischoff, Tasmania, a temporary reduction of the usual output of tin has been occasioned by the low grade of ore that is now being mined, advantage apparently being taken of the high price for the metal to extract the leaner ore.

MANUFACTURE OF PLASTER OF PARIS

Description of Methods Whereby Gypsum Deposits May Be Easily Utilized

BY C. O. BARTLETT

Gypsum rock is found in many States throughout the Union, in large quantities and near the surface. It varies somewhat in color and considerably in hardness. The most of it is quite hard. It contains about 25 per cent. moisture.

Plaster of paris is generally called calcined plaster, and in this article the term calcined plaster will be used hereafter. The manufacture of calcined plaster has increased very rapidly during the last few years. It is the base of all ready-made plaster, and is used in the manufacture of portland cement, and for many other purposes. The demand for it is increasing rapidly. To manufacture this gypsum rock into calcined plaster, in quantities of 50 tons per day of 10 hours, the following machinery, with weight, h.p., etc., is required:

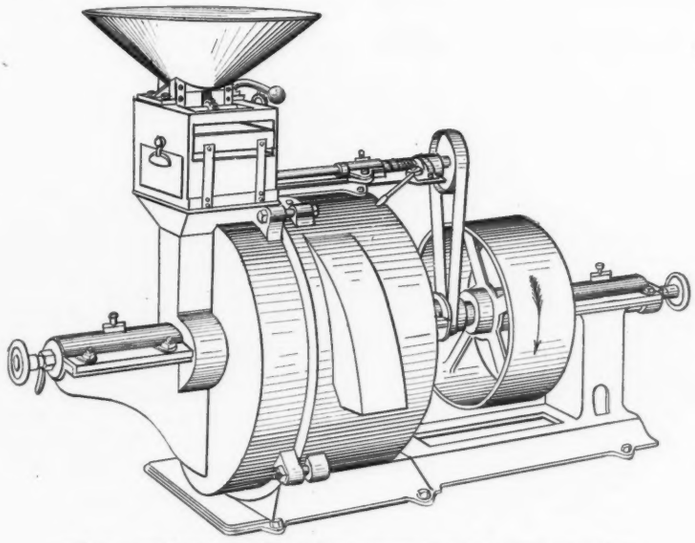


FIG. 2. FINISHING GRINDER FOR PULVERIZING PLASTER OF PARIS.

The gypsum rock is first crushed in an ordinary, 9x15-in. jaw breaker, which will crush five tons an hour. The breaker weighs 15,000 lb. and requires 10 h.p. to drive it. From this breaker the crushed gypsum rock goes to the second crusher, called a pot crusher (Fig. 6), and is again crushed. The weight of this crusher is 3500 lb. The power to drive it is 10 horse-power.

From the second crusher the material goes to the drier (Fig. 1), the weight of which is 21,000 lb. It requires 8 h.p. to drive, including exhaust fan. This drier should be erected in brick-work similar to a boiler. It should have an automatic feeder. The products of the fire should not come in contact with the material being dried on account of the danger of discoloring it, if soft coal or wood be used as fuel. In some places, however, the products of the fire are allowed to come in contact with the material even when coal is used for fuel. Where this is done great care should be used in firing. On general principles it is better not to have the fire come in contact with the material at all, if coal or wood be used for fuel. Any kind of fuel can be used—oil, gas, coke, wood or coal. This drying process iliminates 10 per cent. of the moisture of the rock.

From the drier the crushed rock goes to a trommel, 36 in. in diameter and 12 ft. long, with 24-mesh wire cloth. That which passes through the 24-mesh screen goes to the bins over the kettle. The remainder goes to the bins over the grinding mills (Fig. 5), which have solid French buhr stones with iron frames. The stones are very heavy, 8 in. in thickness and 36 in. in diameter. The weight of the mills is five tons, and it requires 35 h.p. to drive them. The product from the stones should pass to bins over the kettle. The ground gypsum is now ready for boiling.

The boiling is done in a large kettle, 10 ft. in diameter and 10 ft. deep (Fig. 4). The weight of this kettle is 10 tons, and it requires 25 h.p. to drive it. The kettle is made with wrought-steel sides and cast-iron, or very heavy steel, bottoms made convex so as to better resist the heat without sagging. The shell of the kettle should be made of heavy steel. There should be four flues about 12 in. in diameter running through this kettle near the bottom. Inside of the kettle is a heavy shaft supported from above, with a heavy sweep or stirrers below the flues near the bottom, and some mixing paddles also above the flues near the top. This shaft should be very strong and supported from above; otherwise the weight of it would tend to break down the bottom of the kettle. The bottom of the kettle is a little smaller so there is room to raise the old one out and admit putting in a new one. A 10-ft. kettle will hold 10 tons. The kettle is set on heavy brick-work with fire front, doors, grate bars, etc. The heat passes directly under the kettle and around the lower part of the sides, then through the flues and around the upper part of the sides, then out at the stack. The flange ring for supporting the kettle is 8 ft. from the bottom, resting on top of the brick-work. The brick-work for the kettle should be 2 ft. 6 in. thick and 8 ft. high. It requires about 22,000 brick to erect properly one of these kettles.

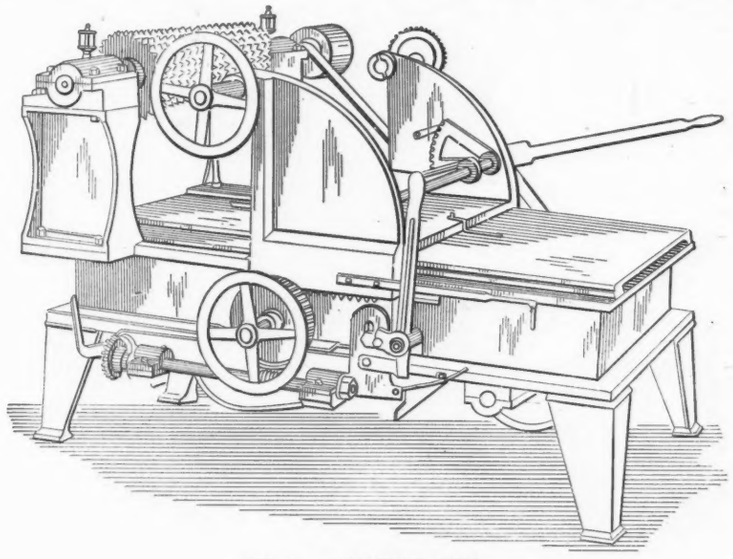


FIG. 3. WOOD-FIBER MILL.

The ground gypsum is fed into the kettle in quantities of about 10 tons at a time and continually stirred and boiled

until the remainder of the free water is driven off. It usually takes about two hours to boil one batch. It should be brought to a temperature not to exceed 265 deg. F. When properly boiled it will settle and is ready to be discharged. This is done through a discharge gate on the side near the bottom, this gate being operated with a lever from above. This is the first boiling, or settling. A large proportion of the calcined plaster is used in this form. If it be desired to make a finer grades, it is necessary to boil it a second time, which is in reality to take out the water of crystallization. If this water of crystallization is once started, it must be taken out; otherwise the calcined plaster will be spoiled. Therefore it is important not to get the temperature above 265 deg. in the first boiling, and from 390 to 395 deg. in the second boiling. Considerable care must be taken with the boiling of the material, for here is where the chemical action takes place. After the material has been boiled it should be screened again with a trommel with 40-mesh wire cloth. The oversize from this trommel should then be ground by a 24-in. French buhr mill (Fig. 2).

In addition to the above mentioned machinery the necessary elevators, conveyers, shafting, belting, bins, etc., will be required. On account of the nature of the material, the bins, conveyers and elevators should be made of steel, and elevators and conveyers should have steel casings. The estimated weight of elevators, conveyers, etc., is 10 tons, and the power to drive them 25 horse-power.

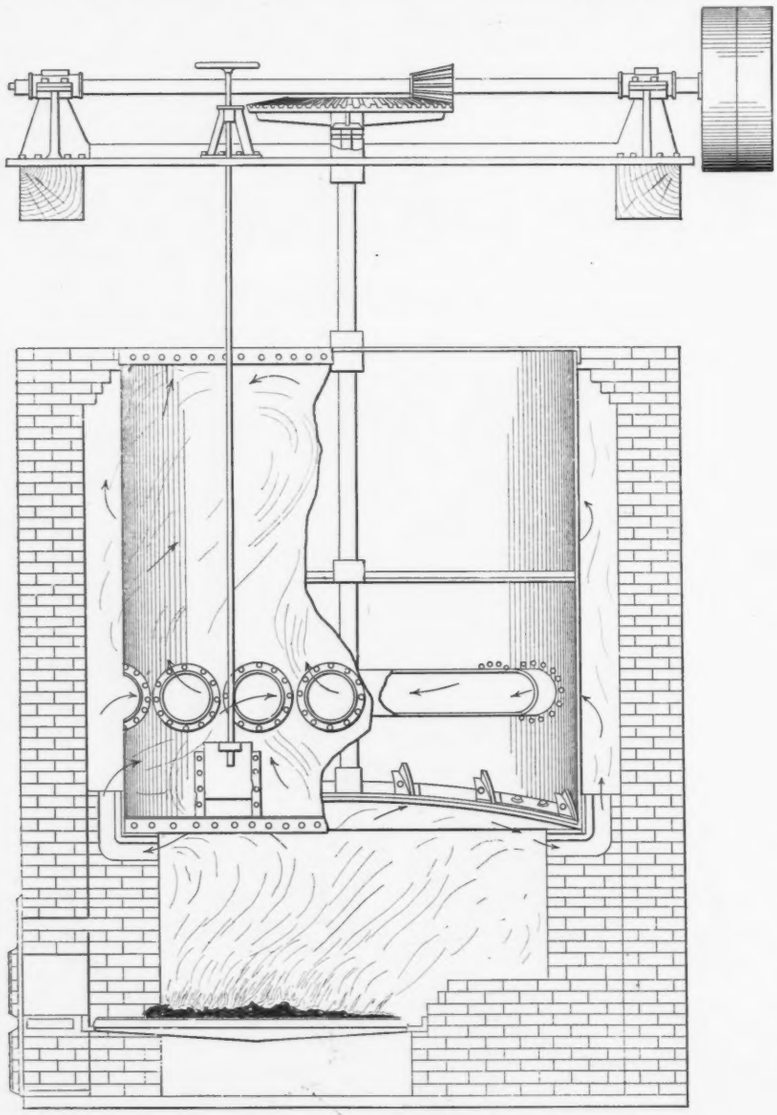


FIG. 4. BOILING KETTLE FOR MAKING PLASTER OF PARIS

To manufacture ready-made plaster, or ready-mixed plaster, the calcined plaster is used as the base. It is mixed with sand, hair and retarder, or wood fiber and retarder, in the following proportions for wall plaster: Calcined plaster, 300 lb.; goat hair (about), 1 lb.; dried sand, 600 lb.; retarder, from 1½ to 2 lb.

If desired, hydrated lime can be used; and if so, one-third as much hydrated lime as there is calcined plaster. Also about 2 lb. of asbestos fiber can be used to good advantage; sometimes this adds considerably to the working of the plaster. For sand mortar and brick walls 300 lb. of calcined plaster and 900 lb. of dried sand are used; no hair is necessary. There must be either all calcined plaster and sand, or calcined plaster part and hydrated lime part and the remainder sand, in the proportion of one part calcined plaster to two parts of sand for lime mortar, and one part calcined plaster to three parts sand in brick mortar.

Wood fiber is largely used for ready-made wall plaster, and is one of the best fillers known in plaster work. It makes the plaster elastic and decreases its weight and it also helps to make it sound proof and electricity proof. The following is a good proportion when wood fiber is used: Calcined plaster, 600 lb.; clay, 150 lb.; wood fiber, 40 lb.; retarder, from 3 to 5 pounds.

The color of the clay makes no particular difference, as a white coat usually follows. Some manufacturers use a low-grade cement, and add as much as 200 lb. of it to the above formula.

Wood fiber can be made of almost any kind of soft wood. It is made as follows: First, the wood is cut into lengths to suit the machine, usually about 2 ft. long and about 24 in. in diameter (Fig. 3). The block is placed in the carriage between centers and caused to revolve around the shortest diameter. The saws are set on a bias and revolve very rapidly, so that instead of cutting directly into the wood they make it into fibrous material, each piece being from ½ to 1½ in. long, according to the fineness of the material desired. This machine weighs 2000 lb. It requires 15 h.p. to run it.

The proportion of materials in making ready-made plaster can be varied according to the demand of the architect and the purpose for which it is to be used. Large quantities of hemp or old rope were formerly used, but are not used much at the present time. Calcined plaster is the base of all hard plaster, and without it hard plaster cannot well be made. The retarder is used to prevent the quick setting of the plaster. It is manufactured at several places and can be bought for $45 a ton. In making a good quality of ready-made plaster is is very important either to weigh or measure the material carefully. No guessing should be allowed. It is also important to mix thoroughly the materials, and the use of a batch mixer is always recommended.

The Sechura Sulphur Company, on Bayovar, on the Bay of Sechura, Peru, has constructed 15 km. of railway and a pier 100 m. long at Bayovar. Other works are in progress. The company is building a refining works to treat the crude mineral. The estimated daily production of the works is 100 tons of refined sulphur.

Hydraulic Mining in California

BY C. G. YALE

The Anti-Débris Association is becoming active again in the fight against the rehabilitation of hydraulic mining in California, and has decided to send out a number of watchmen, or what the miners call spies, to see if injunctions of the courts against hydraulic mining are being enforced. The advent of the mining season with its attendant water supply has caused this renewed activity. The Association has also appointed a permanent committee to look after dredging operations, with power to act and to employ an engineer, and if they deem necessary to report to the attorneys of the association. This sounds a note of warning to the dredgemen, when the people who virtually killed the hydraulic mining industry see fit to set a committee to watch them.

The Polar Star hydraulic mine case now before the Supreme Court of California will be a test of the constitutionality and scope of the Caminetti law, under which the California Debris Commission was created and given power to issue permits for hydraulic mining. The suit was brought by the county of Sutter. William Nichols, the defendant, owned the Polar Star mine, near Dutch Flat in Placer county, in the watershed of Bear river, and the tailings of his mine, if unrestrained, would flow into that river. He had a permit to mine under the Caminetti Act, and was so mining when action was begun against him. An injunction was issued by Judge Davis in Sutter county, that county being interested by the fact that the water of Bear river flows through it by confluence. The Court found that the restraining works constructed by Nichols under his license were insufficient. The permit issued by the California Debris Commission to mine, after the works had been provided and approved by the commission, had not been recalled but the appeal which is now in the Supreme Court of California for hearing, whenever the case is reached, had followed.

In the case is presented the question whether a permit issued by the Débris Commission will prevent a court from issuing an injunction where it can be proved that the mine is doing damage. The Anti-Débris Association claims that a government permit to mine can be no defense when it is decided that damage is being done. The miners claim that when they have a license to construct a restraining dam as ordered by the Débris Commission, and are working under its orders and protection, the courts have nothing to do with it. In other words that the granting of the permit by the commission authorized by Congress, is final until it is revoked, and that the State courts have no jurisdiction.

Under this Act provision was made for the appointment of a commission of government engineers to be known as the California Débris Commission, and also for the resumption of hydraulic mining under certain specified safeguards. The provisions included several relating to the construction of débris dams to be paid for and made by the hydraulic miners who wished to pursue their industry in conformity to the Caminetti act. No permit to mine by hydraulic process in the sections of the State comprising the watersheds of the Sacramento and San Joaquin river systems, over which the Débris Commission was given jurisdiction, could be issued until the commission was satisfied that all impounding dams and other restraining works had been constructed, together with adequate settling reservoirs. For a time it was supposed that the Caminetti act had solved the difficulty, but the Anti-Débris Association has succeeded in getting injunctions from district courts in the anti-mining counties. It is not thought that the California Supreme Court decision will settle the case, as the final adjudication must come from the United States Supreme Court. The present case is but one of the steps toward that end.

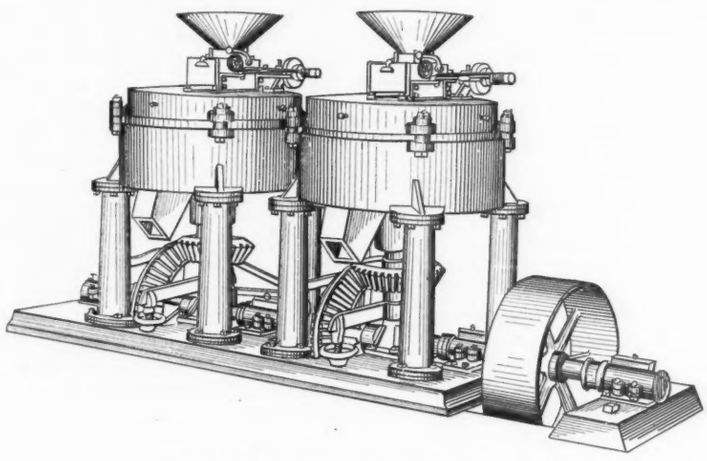


FIG. 5. BUHR MILLS FOR GRINDING GYPSUM

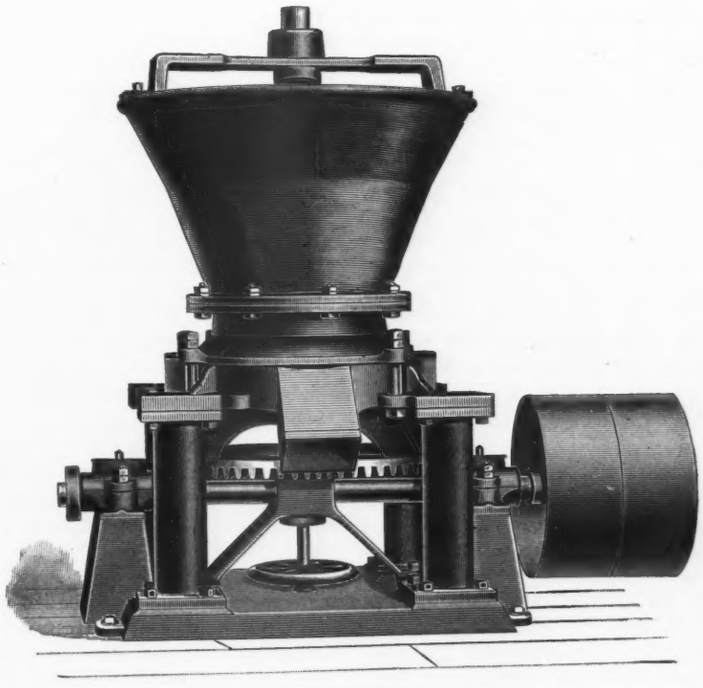


FIG. 6. POT MILL FOR GRINDING GYPSUM

The Compagnie des Mines d'Ouasta & de Mesloula (of Algeria) is operating a calamine mine at Djebel Ouasta, 50 km. east of Souk-Ahras (Constantine), and a galena mine at Djebel Mesloula, 5 km. west of Clairfontaine (Constantine). The production in 1905 was about 10,000 tons of calcined calamine.

LOS PILARES MINE, NACOZARI, MEXICO*

The Geology of a Very Remarkable Ore Deposit

BY SAMUEL FRANKLIN EMMONS†

The Los Pilares mine is situated on a northeast and southwest spur that runs athwart the end of the steam railway from Nacozari. The tracks continue in a mile-long tunnel that runs nearly through the spur, and is operated by electric locomotives. At the further extremity of the tunnel is the main working shaft that rises vertically 600 ft., reaching the surface on the southeast slope of the spur known as Los Pilares mountain. From this shaft levels run at 100-ft. intervals into the various stopes of the mine, and ore chutes connect the different levels with great ore bins in the rock at the tunnel, or 700-ft level. As thus opened, the ore, once broken down in the stopes of the mine, is moved mechanically with a minimum of hand labor. From the ore bin in the mine it passes into the narrow-gage cars which transport it to the concentrator, and after dressing, the concentrates pass into standard-gage cars to be transmitted to the smelter at Douglas, Arizona.

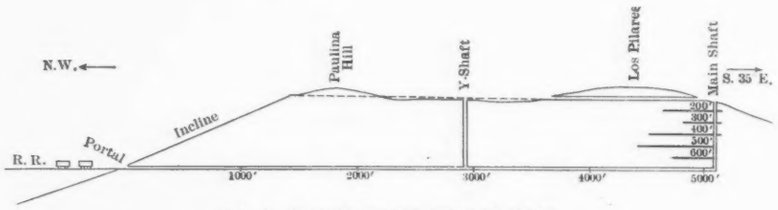


FIG. 1. PROFILE OF LOS PILARES RIDGE

At 300 ft. from the portal of the tunnel a vertical shaft rises to the surface, known as the Y shaft. Through the top of Pilares mountain, on the so-called 100-ft. level, runs a tunnel 1,300 ft. long through which the ore was formerly transmitted from the working shaft to the head of an incline immediately over the portal or entrance to the present tunnel.

COUNTRY ROCK.

The rock forming the mass of Paulina hill is a fine-grained andesite with latite tendency. Even in the freshest specimen, however, the feldspars are much altered and sericitized and the basic silicates are no longer recognizable. The alteration products are largely sericite and chlorite with some calcite. Its dark reddish-purple color is due to considerable amount of microscopic magnetite and hematite, with possibly some ilmenite. A little pyrite is also seen in the groundmass. The rock is in great part an eruptive breccia in which the matrix and enclosing fragments are of the same material, and it often shows a distinctly bedded structure.

CHARACTER OF THE ORE.

The ore of the Los Pilares is remarkably simple and uniform, both in structure and composition. It is essentially a breccia of which pyrite, chalcopyrite, and quartz constitute the original cementing material, for, although much of the more massive rock is more or less impregnated with metallic sulphides, this impregnation has thus far proved commercially negligible.

Beside copper, iron and sulphur, it contains practically no other metal. In some places there is a very little zinc, but no lead is known to exist. There is a trace of gold and less than an ounce of silver to the ton. The primary ore minerals are pyrite and chalcopyrite, the products of secondary enrichment being bornite and chalcocite, the former apparently in the larger proportion. In the gossan, as is often the case in arid regions, the limonite is almost entirely altered to specular iron. In the 1300-ft. tunnel, at the 100-ft. level, which is within the oxidized zone, only slight traces of pyrite were found, and, though its copper had been leached out, the ore still retained its characteristic breccia structure, and at a little distance might have been mistaken for the normal copper ore.

DISTRIBUTION OF ORE.

The manner of occurrence of the ore is singular. It is not a vein deposit, nor does it occur in what might be called a chimney or stock. From a first inspection of the drifts and stopes, shown on the mine maps, one might be led to think that in the interior of Pilares mountain is a huge dome-shaped boss surrounded by a shell of ore 100 ft. or more in thickness. This appearance may perhaps be understood by an inspection of Fig. 2, which is a sketchy projection of the main drifts on to the 400-ft. level, in which the squares represent roughly the areas stoped in the southeastern part of the hill, whence has come the greatest part of the ore mined up to this time. The stopes and drifts, both above and below this level, are singularly like it in form, varying mainly in their relative extent.

Observations along the two tunnels, and in other drifts in the interior of the hill, show that, in point of fact, the ore is not confined to the outer shell, but that the whole mass of Pilares mountain between the two shafts is more or less impregnated with ore, though not always of a quality that would pay to work under existing circumstances. The original deposition, as well as the secondary enrichment, which has rendered the ore rich enough to work, are both dependent on dynamic movements that have taken place along certain fracture planes. To illustrate this, these structural features, which have had to do with the unusual concentration of ore in the southeastern part of the mine, have, in the sketch (Fig. 2), been emphasized by indicating their intersections with the mine workings on each level of the mine as far as they could be observed. They will be described somewhat in detail.

The earlier of the two faults, which is designated on Fig. 2 as the slip-plane, crosses the station on each level a short distance north of the main shaft and runs in a nearly east and west direction parallel to the main drifts of this part of the mine. It is a singularly clean, smooth plane of movement without clay selvage, sometimes made up of several closely-spaced planes. At one point 21 such planes were counted in a width of less than 2 ft. It stands nearly vertical, having a dip of about 70 deg. to the south and in strike shows a tendency to bend northward at either extremity.

The passage from solid, practically barren monzonite to mineralized breccia, as one crosses the slip-plane on the successive levels, is remarkably sharp. Pyrite is first seen in thin, vertical seams on the inner planes of movement beyond which the whole mass is typical breccia. At first the cement is made up mostly of metallic sulphides, then of an increasing amount of quartz and ground-up fragments of country, the sulphides decreasing in a general way with the distance from the fissure.

The second plane of movement is seen about 250 to 350 ft. east of the shaft, where it crosses the slip-plane nearly at right angles, its average strike being a little west of north. Following it along the strike it proved to be a dike of very dark diabase that had been subjected to movement and intense compression.

The great mass of richer ore, whose exterior limit is defined by these two planes, and which, as shown by the maps, has a somewhat curving outline, is said to have been worked for a length of 1300 ft. along the arc of the so-called circle, whose chord is 800 ft. across. The stopes of richer ore extend from a short distance below the 100-ft. level down nearly to the

*Abstract of a paper in *Economic Geology*, I, VIII, 629-643.

†Of the U. S. Geological Survey, Washington, D. C.

500-ft. Below this the ore is said to be falling off in grade, so that it can no longer be broken down in mass, as above. It is thus evidently to secondary enrichment that it owes its quality as pay ore. Above these limits, the copper is leached out; within them is the greatest concentration of the richer sulphides and, while they can still be observed in the lower levels of the mine, it is evident to the eye that they are in decreasing proportion. The actual amount of ore in the hill, averaging 3 per cent. copper, must be something enormous.

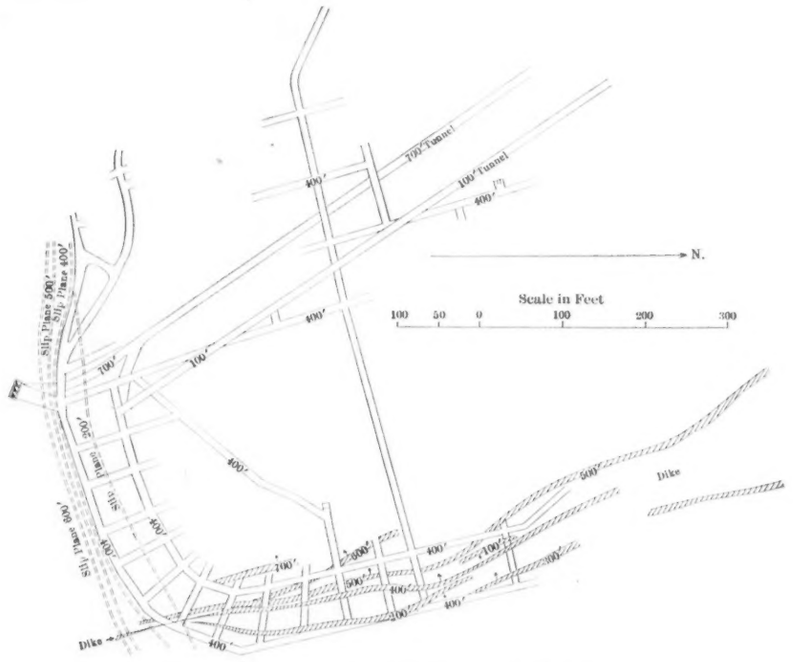


FIG. 2. HORIZONTAL PROJECTION ON 400-FT. LEVEL

PILARES OREBODY

About 400 ft. north of the main shaft is the Pilares orebody. It is newly opened and on the 400- and 500-ft. levels only, and its relations to the fracturing were not so clearly seen, but a strong northeast fissure, 4 inches in width, was observed to run through it on the 500-ft. level, and immediately under this, on the 700-ft. or tunnel level, is a strong vertical fault zone, with 5 or 6 ft. of fault material.

The study of these deposits has proved especially interesting because of a certain analogy between them and a new type of deposits which are proving of increasing economic importance. These are the bodies of disseminated cupriferous pyrite along shattered zones in porphyry that have been sufficiently enriched to admit of successful reduction by dressing such as are being worked at Bingham, Utah, and Ely, Nevada.

India and Japan are the coal producers of the Orient. Japan's coalfields are now actively worked, but India's are only partly developed.

Rhodesia Mineral Production

The gold production in October, as reported by the Chamber of Mines, was 45,664 oz. bullion, an increase of 11,952 oz. over October, 1905. For the 10 months ending Oct. 31 the total was 339,344 oz. bullion in 1905, and 455,063 oz. in 1906; an increase of 115,719 oz., or 34.1 per cent. The bullion reported this year was equal to 405,016 oz. fine gold, or $8,371,681 in value.

The output of other metals for the 10 months included 578 long tons of lead, an increase of 30 tons; and 99,341 oz. silver, an increase of 22,518 oz. There are reported also this year 27 tons of copper, 14 tons of tungsten ore and 875 tons of chrome ore. Coal production, from the Wankie mines, was 78,646 tons in 1905, and 89,376 tons in 1906; an increase of 10,730 tons.

The Williamson Furnace, Birmingham, Ala.

The railroad-car shortage is still interrupting the steady delivery of iron in the Southern territory. A significant incident in the iron trade in the Birmingham district is the statement that the little furnace of the Williamson Iron Company, located in the city limits of Birmingham, with a daily capacity of between 80 and 100 tons, has been blown in and is making iron after an idleness of three years. The company has to buy all its raw material and the furnace being located right in the city limits has more or less trouble in getting this raw material delivered. The furnace can only operate profitably when the prices are high.

The Josephi Secundi Tunnel

The Josephi Secundi tunnel, driven through the mining districts of Schemnitz, Hungary, 16,535.5 m. in length in a straight line, did not fulfil the expectations, most of the veins at its level being found very poor. An exception is observed, however, at the end of the tunnel at Francis Joseph shaft, 276.36 m. (906.7 ft.) above the level of the Adriatic sea, where, in a vertical extension of about 100 m. (328 ft.) downward on the Grünergang, rich silver-gold ore has been found. This tunnel, in the near future, may find use as a Hungarian State Railroad tunnel by driving it farther down Schemnitz valley. The length would be about 8 to 10 km. The most important fact to be considered at this tunnel is the water power now partially wasted, but which might be made useful by turning it into electric energy for railway traffic. The water stocked in the reservoirs amounts to about 75,000,000 cu.m., and the average hight is 200 m. (656 ft.) The geological formations are not unfavorable to finding some useful veins of mineral in the proposed extension of this tunnel. Such an idea is not so easily brought to life in Hungary as in the United States, but the present Minister of Public Works and State Railroad, Francis Kossuth, being himself a renowned engineer, may be expected to pay some attention to this proposal.

Lake Ore Prices

While the advance in the base price of Lake Superior iron ores, recently noted in our columns, has been from 50 to 75c. per ton, the advance has been really greater than that, owing to a lowering of the guaranteed iron content. The following table shows the base guarantees for 1907, as compared with those for the current year:

Bessemer Ores:	Old Range.		Mesabi.	
	1906.	1907.	1906.	1907.
Iron %, natural	56.70	55.00	56.70	55.00
Moisture	10.00	10.00	10.00	10.00
Iron %, 212 deg	63.00	61.12	63.00	61.12
Phosphorus %	0 045	0.045	0 045	0.045
Base price	$4.25	$5.00	$4.00	$4.75
Non-bessemers:				
Iron %, natural	52 80	51 50	52 80	51.50
Moisture	12 00	12.00	12 00	12 00
Iron %, 212 deg	60.00	58 52	60 00	58.52
Base price	$3.70	$4.20	$3.50	$4.00

Under these conditions, the actual increase in price to furnacemen is 90 to 95c. for bessemer ores, and 60 to 65c. for non-bessemers.

A mysterious diamond-mining concession in Netherlands Borneo aroused curiosity at Batavia last summer. Diamonds were said to have been found in fabulous abundance at Tainam. At Martapura, in Netherlands S. W. Borneo, the Borneo Mining Company is carrying out extensive diamond-digging operations. The French branch of the Rothschild family is said to be largely interested.

TESTING BLOWERS*

Measurement of Volume, Pressure and Horse-Power

VELOCITY

The volume of air discharged from an orifice or pipe is, theoretically, equal to the product of the velocity of the air flowing and the area of the orifice. Hence for the calculation of volume, the velocity is an important factor. To determine the velocity, the Pitot tube is commonly used as shown in the accompanying illustration. It should be inserted in the center of a straight run of blast pipe within about 10 ft. of the blower. One part of the Pitot tube transmits the total pressure, which is the sum of the static pressure and the velocity pressure. The other part, in communication with the slots shown above, transmits the static pressure. Evidently the difference is the velocity pressure. Each is connected to a water gage which should show magnified readings so that the difference may be accurately determined.

ACCURACY

Great care should be exercised in measuring the velocity pressure, and the instruments should be carefully calibrated. In the ordinary blast pipe for conducting air from the blower to the cupola or furnace, the velocity should not exceed 2000 or 3000 ft. per minute. As this velocity corresponds to a pressure of only about 0.4 in. of water, the measurement requires care, but with good instruments the readings will be accurate enough for all practical purposes.

VOLUME

The velocity pressure being known, the volume of free air passing through the pipe may be determined from the following formula:

$$V = av = \frac{60\, ac\, P_1}{P}\sqrt{\frac{2gp}{d}},$$

in which V = the volume of free air in cubic feet per minute,
c = coefficient of Pitot tube, which should be determined for each tube,
a = area of the pipe in square feet,
v = velocity in feet per minute,
$2g = 64.32$,
p = velocity pressure in pounds per square foot; p is the difference between the two pressures observed on the Pitot tube,
d = density or weight per cubic foot of air at pressure, temperature, and humidity at point of observation,
P_1 = absolute pressure of air in the pipe in pounds per square foot,
P = atmospheric pressure in pounds per square foot.

HORSE-POWER

Assuming that the air is compressed without cooling, the horse-power may be found from the following:

$$\text{Horse-power} = VP\left[\left(\frac{P_1}{P}\right)^{\frac{1}{3.5}} - 1\right] \div 11{,}000.$$

in which V = volume of free air in cubic feet per minute, as found above,
P = pressure of the atmosphere or suction pressure (absolute) in pounds per square foot,
P_1 = pressure of compression (absolute) in pounds per square foot.

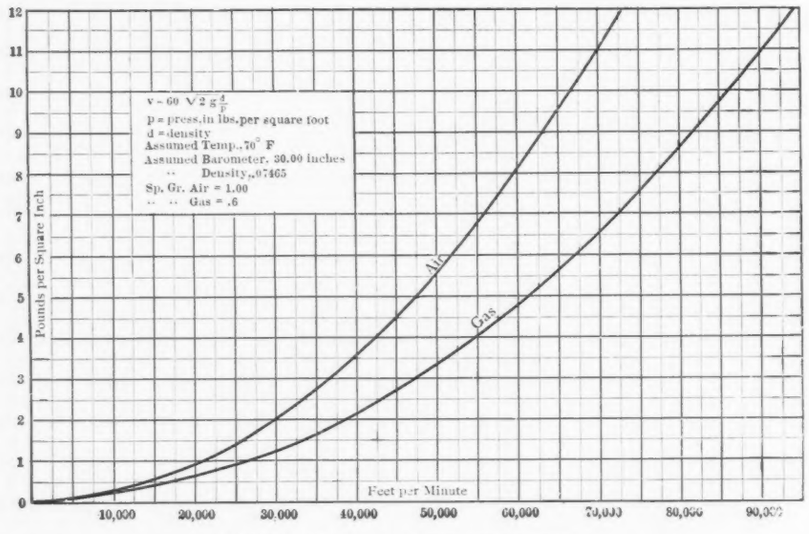


DIAGRAM OF HORSE POWER AND VOLUME

FORMULAS

Including the preceding, there are four formulas sometimes used in computing the power required. Values obtained from these formulas have been placed in the form of curves and are shown in the accompanying engraving.

(1) H. P. $= VP_1 \left(\frac{P_1}{P}\right) \div 33{,}000.$

(2) H. P. $= VP \left[\left(\frac{P_1}{P}\right)^{\frac{1}{3.5}} - 1\right] \div 11{,}000.$

(3) H. P. $= V \quad (P_1 - P) \div 33{,}000.$

(4) H. P. $=$ (lb. per sq. in. $\times V$) $\div$ 200.

Formula No. 1 gives the horse-power required when the air is cooled during compression, as in the ordinary air compressor.

Formula No. 2, which has been explained, is used when it may be assumed that the air is compressed so quickly that it does not have time to cool to atmospheric temperature, as in nearly all blower work.

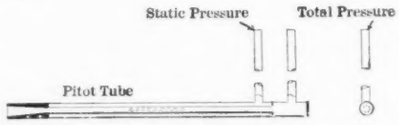


DIAGRAM SHOWING USE OF PITOT TUBE

Formula No. 3, the ordinary "hydraulic" formula, is ordinarily used for pressures up to 5 ounces.

Formula No. 4 is frequently used by other makers of positive or rotary blowers, for determining the horse-power required for operating their machines. In this formula V = the volume of air displaced by the impellers, no allowance being made for slippage.

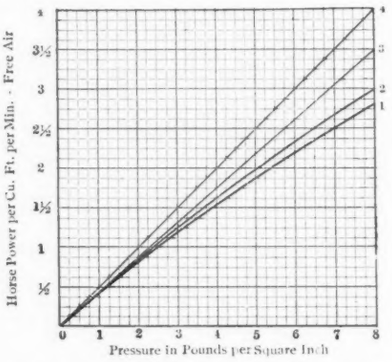


DIAGRAM OF HORSE-POWER AND PRESSURE

According to the engineers of the Tanganyika Concessions, Ltd., a tin belt extends in the Congo Free State from the Busanga mine on the Lualaba river northeasterly to the Lufira river, a distance of about 110 miles, and in this belt many locations have been made of both alluvial and lode tin. It is considered that this will be a tin field of great commercial importance. Eight and a half tons of bar tin were made last year by the crudest methods, and nine tons have been made at Busanga this year. The mines are said to be well located for cheap working when adequate means for transportation are provided.

New and important discoveries of coal follow each other closely in Lorraine, at Eply, between the frontier and Point-à-Mousson. On Oct. 5, 1906, the existence of a seam 1.33 m. thick was proved. The drill struck a second seam, Oct. 7, 1.30 m. thick, at a distance of 12 m. below the first, and a third seam 1.36 m. thick, on Oct. 11. The Lorraine basin appears to be rich in coal.

*This useful and reliable information is taken from catalog No. 140, recently issued by the B. F. Sturtevant Company, Hyde Park, Mass.

The Zinc Resources of British Columbia

According to the report of the Commission appointed by the Canadian Government to investigate the zinc resources of British Columbia and the conditions affecting their exploitation, the production of zinc ore in the Slocan district has already attained considerable proportions. In 1899, the shipments amounted to 1600 tons; in 1902, 1282 tons; in 1903, 2564 tons; in 1904, 2828 tons; and in 1905, 8561 tons. So far, the Slocan is the only district of British Columbia which has produced zinc ore, but the occurrence of the mineral has been noted in many districts of the Province, and it is probable that some of them will become productive when adequate railway transportation is provided. The majority of the mines of the Slocan, and in fact the entire West Kootenay, are essentially silver-lead mines, in which zinc blende occurs as an accessory mineral, although there are certain mines which are essentially zinc mines. The silver-lead veins of the Slocan are extremely irregular. They are generally narrow and the pay streaks are thin. However, the silver-lead ore is generally of high grade in silver, which has made it possible to operate certain of the mines at an excellent percentage of profit, which will be increased by the recovery of zinc ore as a by-product. It is estimated that if the mines of the Slocan are diligently operated, they may produce 15,000 tons of zinc ore of 50 per cent. grade per annum, while the mines of Ainsworth camp may produce about 16,000 tons per annum, and after developments of a year or so may produce 30,000 tons per annum.

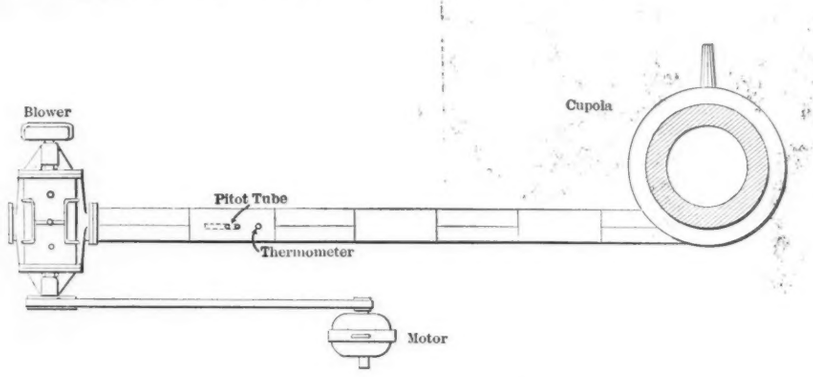


DIAGRAM SHOWING USE OF PITOT TUBE

The methods of mining commonly practiced in the district are criticized. It is pointed out that a great deal of money has been wasted through unwise development work, and that the character of the veins is such that the ore should be followed carefully. It is urged that the leasing system of operation should be generally adopted, that hand sorting of the ore should be more commonly practiced, and that in the milling of the ore attention should be directed rather to the extraction of a high percentage of the minerals than to the performance of the operation at the minimum cost, which, heretofore has been a serious mistake.

The possibility of enriching the zinc ore of British Columbia to a high degree by magnetic separation was thoroughly demonstrated by the tests conducted by the Commission. The ores tested were of wide variety and represented all the classes that the mines of the Province are capable of producing. In every case it was possible to produce a concentrate assaying upward of 40 per cent. zinc; in many cases concentrates assaying about 50 per cent. zinc, and in a few cases concentrates as high as 57 per cent. zinc. These results compare very favorably with those which are attained in the concentration of similar ores in the United States, in Australia and in Europe.

Of practical importance in no way inferior to the degree of concentration is the matter of percentage of mineral extracted from the ore. With the exception of a few especially difficult ores, the tests of the Commission showed remarkably high percentages of extraction, these rising in one case to nearly 99 per cent. and being upward of 90 per cent. in many cases.

A considerable variety of magnetic separators were employed in the experimental work, but special emphasis is laid on the fact that in magnetic separation, success is dependent not upon the selection of a particular form of separator, but rather upon the correct design of the entire milling process. Attention should be concentrated not on the machine, but on the process. The machine is simply a means to carry out some part of the process. The process being successfully designed, it will frequently be found that several different kinds of machines will do equally well the particular work that is required of them.

The question of the marketing of the ore received full and minute attention. It is pointed out that there are three markets open to Canadian zinc ore, namely the American, the Canadian, and the European. At present, the American market is at a disadvantage because of the tariff of 20 per cent. on zinc ore which has been assessed by the Treasury Department of the United States on sulphide ore, of which character the Canadian product is entirely.

The Canadian market had not been developed at the time of the preparation of the report, the smelting works under construction at Frank, Alberta, not then having been completed. Shipments to the European market would normally be by the way of Montreal.

At Frank, Alberta, and other points on the line of the Canadian Pacific railway in the Crow's Nest coalfield, coal is available at a reasonable price. In the matter of fuel, a smelter situated at those points would be at no disadvantage, although as compared with American and European conditions, he would be at considerable disadvantage in matters of labor, refractory material, and miscellaneous supplies. Taking all things into consideration, it is estimated that smelting might be performed for $15 per ton of ore. From an analysis of all the items in the cost of production and delivering the product to market, it is concluded that zinc smelting in Canada is feasible commercially, especially since a part of the spelter produced in Canada can be marketed domestically, saving something in freight and gaining in price over the European price.

There being many cheap water powers in Canada, particularly on the Pacific coast where supplies of zinc ore are also available, the question of electrothermic smelting was considered, although in view of the infancy of this art, but little definite advice could be offered. It was considered that from the present development of electrothermic smelting of zinc ore, and the theoretical calculations respecting it, the conclusions could be drawn that: (1) Electric smelting will never displace ordinary smelting, if it be necessary to generate the power from coal. (2) Electric smelting may be, in the future, economically conducted at places where very cheap hydro-electric power is available. And (3) aside from the question of power, up to the present time, certain peculiar and serious metallurgical difficulties in electric smelting have not been satisfactorily overcome. It is possible that at some future date the water powers on the coast of British Columbia, and also in eastern Canada may be utilized for the electric smelting of zinc and other ores, but any such development is a matter of the future and is not to be reckoned upon at the present time. The electric smelting of zinc ore must undoubtedly go through many stages of experiment before it can be pronounced a metallurgical and commercial success.

COAL MINING IN THE FAIRMONT FIELD, WEST VIRGINIA

Geology—Labor Conditions—Mine Equipment—Character of the Coal

BY F. W. PARSONS

CHARACTER AND ORGANIZATION OF THE LABOR

The extensive development that has been carried on throughout the Fairmont region has made it necessary for the operators to import laborers from all available sources. This has led to an extensive mixture in nationalities, with the result that the district is cosmopolitan in character. The predominating races employed are American, Hungarian, Poles Slavs and Negroes.

This territory, unlike Western coal fields, has not yet employed many Chinese or Japanese. The Negroes, as usual, are a happy, careless crowd of workmen. They are fairly undustrious and good spenders, never caring to provide for more than a few days ahead. The Hungarians and Poles are more saving so far as the necessities of life are concerned, but they also spend a large part of their earnings for intoxicating liquors. The Americans, who are in the majority at several of the older mines, are sober, industrious, and usually men with families. It is this class of labor that the Fairmont company has depended upon to break the back of all attempts to create labor troubles. Those controlling the operations in this district have vigorously fought every attempt to establish labor unions and organize the field. The efforts of union agitators have been absolutely fruitless up to the present time, and there is little likelihood of the future bringing them more success. The field is so completely controlled by the Fairmont Campany, that any unusual move on the part of employees is immediately known and quick action by the company officials has always frustrated the plans of the organizers.

In 1902, when the great anthracite strike was taking place, the union agents made desperate efforts to persuade the miners throughout the field to come out in sympathy. Some little headway at this time was made by the agitators, but it was found impossible to induce the older employees at the New England and the Gaston mines to consider anything like a strike. Most of these men had been employed by the Fairmont Company since its early organization; many of them owned their homes; and as they were receiving wages equal to the best rate paid union labor in other fields, they could not see where a suspension of work would in any way benefit them. The Fairmont Company, operating as it did throughout the entire strike, received high prices for all its coal, and fared well in a financial way.

FIG. 1. THE PIONEER MINE OF THE DISTRICT

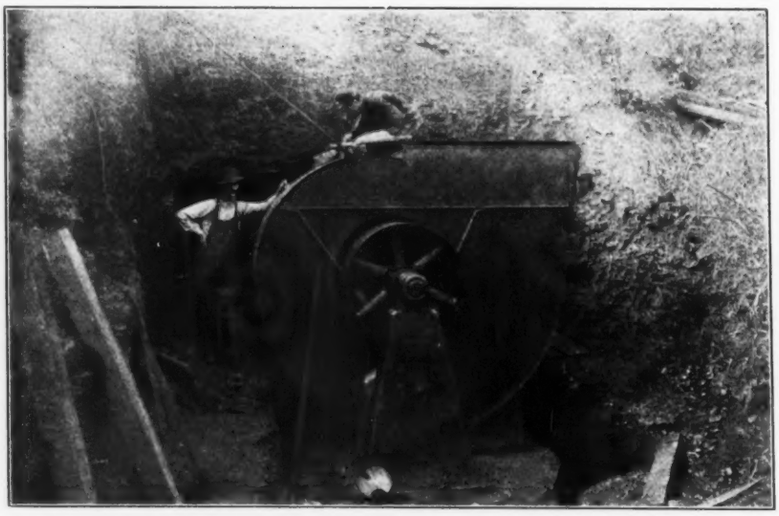


FIG. 2. ROBINSON FAN BEING INSTALLED AT THE NEW ENGLAND MINE

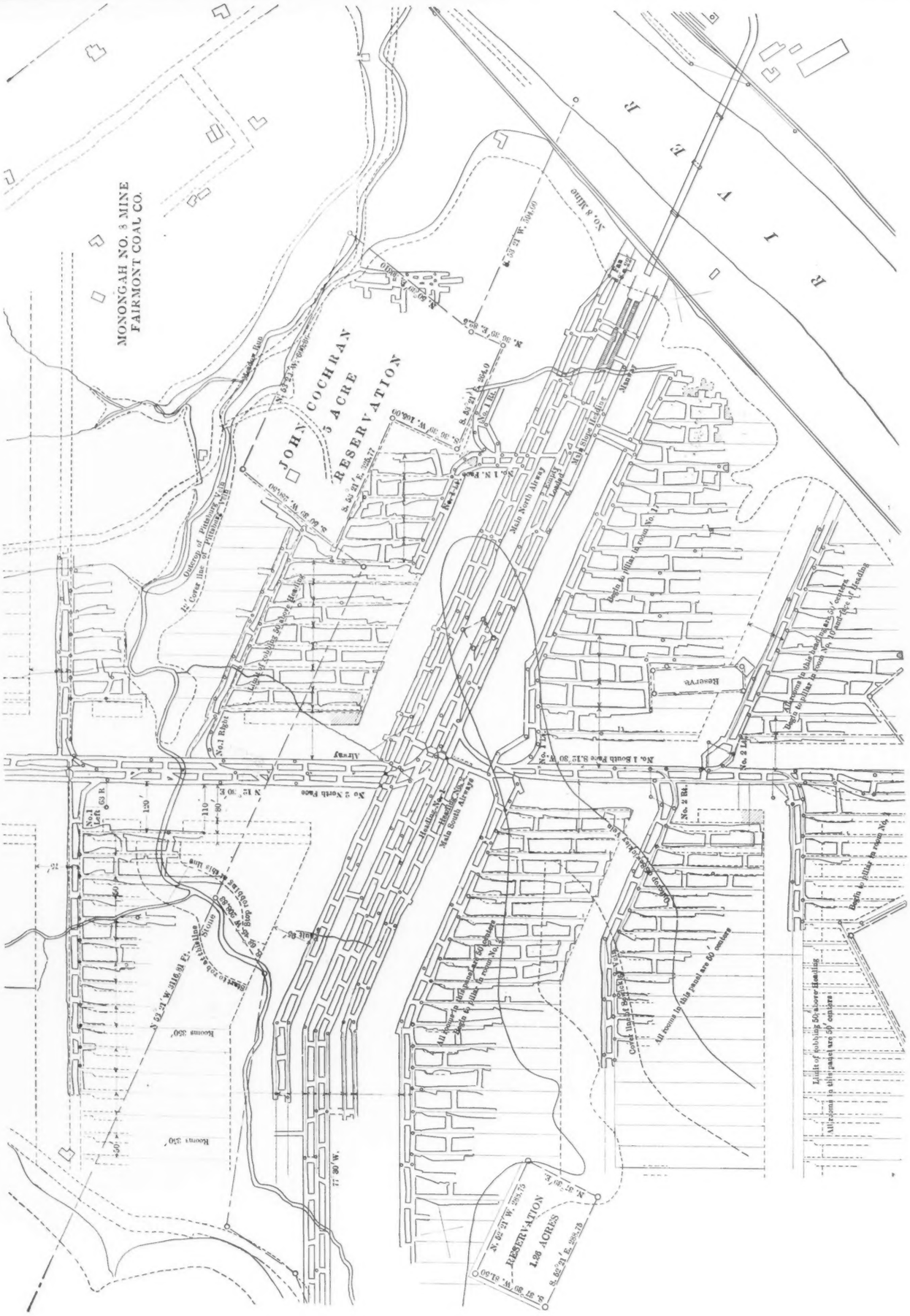
GENERAL EQUIPMENT OF THE MINES

The mines of the Fairmont Coal Company, so far as equipment is concerned, have kept pace with the rapid advance of the industry. Coal-mining machines of the various types are used at most of the properties. Electric motors have in many instances replaced the old system of mule haulage, and steel tipples with automatic dumping and screening arrangements have been adopted at the more recent operations. As an example of the plants already working, we might consider the Maulsby mine near Gypsy, as typical of the region. This property is equipped with Jeffrey mining machines. The coal here lies at about the hight of the railroad, so that it is necessary to hoist it to the level of the tipple floor, where it is dumped and screened.

This mine has a capacity of 1200 tons per day, and is equipped with a haulage engine capable of pulling five 2-ton cars from the mouth of the mine to the tipple, a distance of 450 ft. The tipple is supplied with a Phillips' cross-over dump and a chute for loading run-of-mine and three-quarter coal. The ventilating fan installed at this operation is a 12-ft. Crawford & McCrinnen, and gives abundant ventilation. A pumping station for the water works is also located here, consisting of a No. 10 long throat Cameron pump, connected with a reservoir having a capacity of 200,000 bbl.

THE GYPSY MINE—ANOTHER IDEAL PLANT

The Gypsy mine, located in a valley at right angles with the railroad, is another


MONONGAH NO. 6 MINE
FAIRMONT COAL CO.
JOHN COCHRAN
5 ACRE
RESERVATION
RESERVATION
1.88 ACRES
No. 3 Mine
No. 1 South Face
No. 2 South Face
Main North Airway
Main South Airway
Barrier
Reserve

ideal plant. The power house here is 45 ft. wide and 90 ft. long. The engine and dynamo room is 60x65 ft. The building is constructed of stone and brick. The four boilers are of 125 h.p. each, while the two Westinghouse generators are 150 kw. and are belted to 18¾x21-in. Buckeye engines. The machine shop and blacksmith shop at this plant are equipped to do all kinds of mine work. The 20-ft. fan here installed was designed by the company engineers, and can be reversed when necessary. The fan house is built entirely of brick and stone. The barn is also constructed of brick and stone, is one story high, and has 50 stalls for housing the mine mules. There is also a feed house two stories high, which is connected with the barn by a tramway. Set apart in this house is a space which is called the hospital, for the care of mules and horses that are injured.

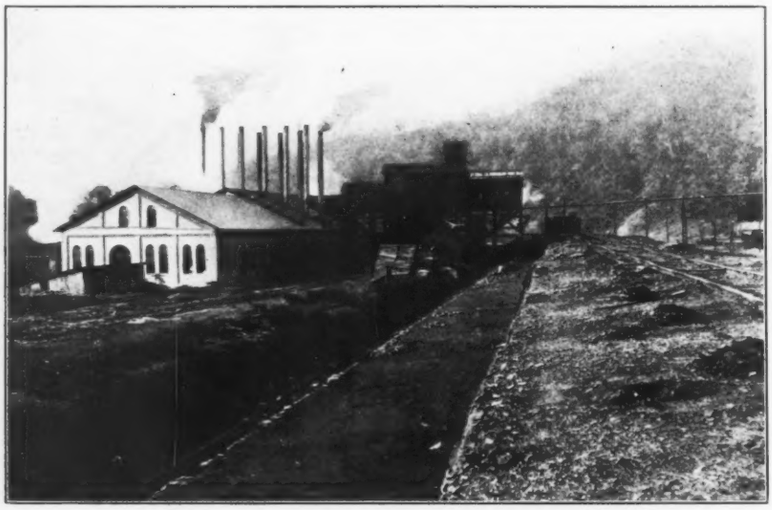


FIG. 3. MONONGAH POWER HOUSE AND TIPPLE IN BACKGROUND

The tipple is a large building and has two sets of screens and one set of chutes for run-of-mine coal, and is also supplied with two Phillips' cross-over dumps. Baker screens are used for taking care of the small grades of coal. Also elevators and conveyors are installed to facilitate the handling of the product. There are seven loading tracks beneath the tipple, which make it possible to load seven railroad cars at one time. The track capacity for standing cars at this tipple is 110 empty cars and 110 loaded. Near the main tipple is a slack bin which receives the smaller sizes of coal from the elevators. The 80 bee-hive ovens here located receive their supply of coal from this slack bin by means of an electric larry.

A MODERN TIPPLE

An example of the modern equipment of a tipple is shown at the Enterprise mine. This tipple is constructed of steel and possesses facilities which permit of the loading of five cars at one time with as many sizes and grades of coal. The chutes, screens, conveyors and elevators are so arranged and constructed that the coal is handled with a minimum amount of breakage, the different sizes being thus delivered, each perfect in its grade and with practically no slack. The large expense incurred in the construction of this tipple has been justified by the satisfactory results that have been obtained. At this mine, as at most of the others, the power house and machine shop are constructed of stone and brick. The three boilers are of 125 h.p. each and furnish the motive power to operate the machinery. Ventilation is produced by a 20-ft. reversible fan specially designed for the company. The fan house is constructed of brick and stone with a slate roof.

FIG. 4. ONE OF THE FIRST STEEL TIPPLES IN THE FIELD

Besides this modern equipment, the Fairmont company has built a large coaling station near Clarksburg, W. Va. This station is equipped with the most modern machinery and is used for coaling the engines of the Baltimore & Ohio Railroad.

GEOLOGY OF THE FAIRMONT FIELD

It is possible in this short article to touch but briefly on the geology of the coal deposits in this district. Volcanic disturbances are unknown in the region, and as a consequence there are no dikes or metamorphic intrusions such as we find in Colorado and other Western fields. This district is a part of the great Appalachian field.

The coal measures around Fairmont are a part of the Carboniferous system, and occur principally in the middle division. The Monongahela series lying directly under the Dunkard, forms the upper strata of the coal measure. This series varies from 260 ft. along the Ohio river boundary to over 400 ft. in the central part of the Appalachian basin. Within this interval there are six coal beds, distributed as follows: Waynesburg, Little Waynesburg, Uniontown, Sewickley, Redstone and Pittsburg. Because of the greater development of these coals along the Monongahela river, early geologists named the series after that stream. In the Fairmont district nearly one-half of the rock material composing the Monongahela series is limestone, while shale and sandstone are less common. According to Dr. White there have never been any marine fossils discovered in the limestone of the Monongahela series, and everything indicates that the deposits are of fresh water origin.

The production of the mines in the Fairmont region at present is mostly derived from the Pittsburg seam, although the Sewickley bed is of fair quality and varies from 5 to 6 ft. in this region. The Redstone bed, which does not appear near Fairmont, shows up again near Clarksburg and further south becomes one of the more important seams.

CHARACTER OF THE COAL AND NATURE OF THE SEAMS

The Pittsburg coal seam, which is generally mined in the Fairmont region, shows a series of thin partings of slate and clays. It is common to subdivide this coal bed into several definite members as follows: Roof coal, over-clays, breast coal, bearing-in coal, brick coal and bottom coal. The roof coal consists of a number of thin layers separated by shales and clays of varying thickness, and having a combined hight of from 3 to 4 ft. This roof coal is entirely wasted, principally because it acts as a good support for the overlying strata. In this way more than 1000 tons of fuel per acre are always lost, although the time will probably come when an effort will be made to secure this coal which is now being wasted.

The second member of the group, known as the over-clay or draw-slate, consists of an impure fire clay and is very dangerous from the fact that large pieces often drop without any warning whatever. This draw-slate is generally taken down and gobbled alongside the rooms and entries.

The next member of the group, known as the breast coal, forms the most important division of the whole bed. It averages about 6 ft. in thickness. Nearly the whole of this 6 ft. of coal is commercially valuable, although at a few of the mines there is 3 or 4 in. of bony coal at the top that is rejected. The bearing-in coal which lies directly under the breast coal is about 5 or 6 in. in thickness. In mining operations the under cut of the breast coal is generally made in this bearing-in coal, and it is from this fact that its name has been given. The brick coal which lies under the bearing-in coal has received its name from the fact that it comes out in rectangular blocks resembling the shape of common brick. It is usually about 1 ft. thick. The Pittsburg bed in the Fairmont field does not generally contain either the brick coal or the bottom coal, although in other districts both these members are present.

The main bed of the Pittsburg seam is always traversed by two cleavage planes, approximately at right angles to each other. These planes are called the butts and faces of the mine.

DIRECTION OF BUTTS AND FACES

In the Fairmont region the butts generally run about S. 75 deg. E., while the faces bear S. 15 deg. W. In this district, however, about 30 miles south of Fairmont the direction of the butts is slightly changed to S. 78 deg. E., and the faces S. 12 deg. W. One characteristic of the Pittsburg coalfield is the number of clay veins which penertate the bed at regular intervals. These clay partings are generally attributed to earth movements, which squeeze up through the under clays and into the overlying coal.

SECTIONS THROUGH THE SEAM

Two of the oldest and most important operations of the Fairmont Coal Company gave special measurements of the coal seam as follows:

GASTON MINE.

		Ft.	In.
Breast coal		4	0
Partings	Bone 0′ 1″; Coal 0′ 2″; Bone 0′ 1″; Coal 0′ 4″; Bone 0′ 1″	0	9
Bottom coal		4	9
Total		9	6

NEW ENGLAND MINE.

		Ft.	In.
Breast coal		3	6
Partings	Bone 0′ 0½″; Coal 0′ 2½″; Bone 0′ 1″; Coal 0′ 3″; Bone 0′ 1″	0	8
Bottom coal		4	4
Total		8	6

CHEMICAL COMPOSITION AND CALORIFIC VALUES

From a number of average samples of Fairmont coal, the following general analysis is obtained: Moisture 0.8, volatile matter 37.50, fixed carbon, 55.04, ash 6.90, sulphur 2.20, phosphorus 0.01 per cent. At the present time the chief chemist of the company has samples taken from the faces of all entries and rooms at each mine and by a system of careful analysis it has been found possible to gather considerable information which is enabling the Fairmont Company to turn out a better product. This method of careful analysis carried on by the chemical department enables it to know the exact composition of the coal produced at each mine, and from this information they are able to furnish consumers with a grade of coal exactly suited for the purpose desired.

In directing the chemical work for the Fairmont Coal Company, Frank Haas, the chief chemist, found that if samples were taken from every tenth room on all entries, or an equivalent distance of 500 ft., the average so determined could be relied upon to represent that particular mine to within 0.2 per cent in sulphur, and 0.25 per cent. in ash, even in the extremely high sulphur coal. The volatile matter and the sulphur content seem to increase toward the southern end of the field. The sulphur found in this coal is mostly combined as sulphide of iron. Sulphur balls, as they are generally called, are found in nearly all of the mines along the river, occurring most frequently in those where the sulphur content in the coal is highest. Mr. Haas finds, from his many determinations, that the calorific value of the Fairmont coal is about 14,100 B.t.u.

THE MANUFACTURE OF COKE AND GAS

Fairmont coal is especially desirable for the manufacture of illuminating gas, and for such purposes the product mined in this region is unexcelled. The coal is what may be called a smoky coal, but with proper methods of firing, this objectionable feature can be easily reduced. The manufacture of coke is greatly hindered by the large sulphur content in the coal; however, the production of a good quality of coke has never received proper attention in this field, it being the practice to coke only the fine coal or screenings. For this reason coke manufacture has been more in the nature of recovery of a by-product than the practice of a special industry..

Few coals in America today are richer in by-products than the fuel produced in this field, and as the mines are located near several towns of good size, besides being in a region where much manufacturing is going on, it seems fairly certain that the installation of a by-product plant would prove a profitable investment. The gas delivered from the by-product oven can be used for fuel and power purposes, as well as for city illumination, and it is not necessary to remove the small amount of sulphur present in the gas by means of oxide, or other purification methods, since it has been found that the evil action of the sulphur on the engine valves and cylinders in gas engines is not sufficient to warrant the cost of its removal. Since it is now known that the gas from by-product ovens can be pumped from 25 to 50 miles without suffering any material loss of candle power by condensation of illuminants, new impetus has been given to the industry. Engines for power purposes are fast coming into use, and this, combined with the use of by-product gas in open-hearth furnaces, heating furnaces, lime kilns, glass smelting furnaces and chemical works, is affording a profitable market for all such gas as can be produced. Where gas contains about 600 B.t.u. per cu.ft, it will require 18 cu.ft. to develop one horse-power.

OTHER HOLDINGS IN THE FAIRMONT FIELD

In the Fairmont region, the two most important tracts as yet undeveloped are held by the St. Louis Union Trust Company, and the Davis Coal and Coke Company; the tract held by the former concern contains 57,411 acres, and is known as the Guffey land, having been taken up by Colonel Guffey, of Pittsburg; the other coal area, owned by the Davis company, contains 25,000 acres, and lies between Fairmont and the Pennsylvania line. The former tract will soon be entered by the Buckhannon & Northern Railroad, a tributary of the Wabash. This will undoubtedly be followed by an early development of this new district. Back of the Guffey tract are thousands of acres of untouched coal land. This land has not yet been bought up, nor in any way developed. No railroads are near, and the coal lies deep. It is probable that the seams under this land will be opened toward the Ohio river.

RAILROAD CARS

The Fairmont company has a large number of railroad cars, which combined with the fact that the interests controlling the company are closely identified with, and friendly to the Baltimore & Ohio Rail-

road, in a way lessens the great trouble from car storage.

ACCIDENTS

The mines throughout the Fairmont field have been particularly free from any serious accidents. This is principally due to the fact that few of the mines are gassy, and the dust is of such a character that it does not easily lend itself to promoting an explosion. The rainfall in the Fairmont region averages about 46 in., and the overlying strata is so formed that the mines are usually kept wet. Whatever accidents occur are generally due to falls of the draw-slate which lies directly over the coal.

Few coalfields in our country today have experienced a greater development or more rapid advancement than the Fairmont region; however, the past results are more than likely to be surpassed by future operations, if present progress is any criterion.

Coal Mining in Natal

According to the official report of the mining industry of Natal, the total output of coal in that Colony in 1905 was 1,129,407 tons, against 858,298 tons in 1904. Of the production last year, 952,638 tons were round coal, 148,689 tons nut, and 28,080 tons undersize. Although the output increased 31 per cent., it was derived from 20 collieries, while 23 mines were operated in the previous year. The Klip river coalfield still yields practically the whole production. The average value at the pit's mouth of all classes of coal was $2 per ton.

The disposal of Natal coal during the last three years was as follows:

	1903. Tons.	1904. Tons.	1905. Tons.
Exported from Durban by sea	7,733	12,431	42,618
Exported overland	15,769	99,514	172,827
Bunkered by vessels at Durban	274.736	383,587	561,250
Consumed on Natal Government railways	206,327	185,404	208,223
Otherwise consumed, stocked in the Colony, or unaccounted for	208,983	167,362	134,489
Total output	713,518	858,298	1,129,407

The imports of coal amounted to 1740 tons, 25 tons coming from Great Britain, and 1715 tons from the United States.

The paid-up capital of the companies engaged in coal mining in 1905 was $9,889,531.38, and the amount paid as dividends was equal to 34c. per ton of coal extracted. The number of persons engaged in the industry was 6252. Indian women are employed in cleaning coal at the picking belts at a few collieries, but females are not employed otherwise in mining work in the Colony. In 1903, thirteen coal-cutters were used; in 1904, forty-seven; while last year seventy-seven were at work for longer or shorter periods. A new seam was discovered at Umlalazi, the extent and quality of which are still imperfectly known, so it may or may not prove of importance: however, as it is much nearer to Durban than any one of the producing collieries, the discovery is of interest.

It is well known that there are extensive deposits of anthracite coal in various ports of the Colony, though such coal has not been worked on a large scale as yet, owing to the difficulty of burning it rapidly and the consequent low speed of steam generation in boilers with the majority of coal users.

The number of accidents at collieries in 1905 was 88, in which 22 persons were killed and 76 injured; the death rate per 1000 persons employed was 3.54, and the death or injury rate 15.77. Judging from the statistics available for the past few years, it may be said that the accident death rates at Natal collieries is generally about the same as at collieries in the Transvaal, where similar unskilled colored labor is employed, and at collieries in the United States, though almost three times as great as in the British Isles.

A New Style of Coke Oven

It is claimed by those who are operating the new Rainey coke ovens in the heart of the Pennsylvania coke region, near Connellsville, that the new style ovens will produce coke for at least 20c. per ton less than the old style beehive ovens. It is also claimed that the labor costs are reduced and the time of coking is shortened by from two to five hours on each charge. These new ovens are 30 ft. long and have a door at each end. They have 95 sq.ft. of floor surface, against 116 sq.ft. in the beehive oven; the coke yield, however, is about the same, despite the difference in floor space, averaging 66 to 67 per cent. of the charge.

The quality of the coke is equal to, if not superior to, the product of the old-fashioned beehive oven. The oven has a high crown with but one trunnel head in the center. There are fewer crown brick and more liners to eliminate the danger of the crown caving in on account of the larger arch.

In building these ovens the use of mortar has been dispensed with, and the operators have substituted a silicious cement, composed of ground lime with 10 per cent. of soft clay. Each brick is immersed in this bath before being placed in position. This cement is infusible at the maximum temperature of ordinary practice and eliminates the possibility of the binding composition being knocked out.

The inventors of these ovens are now perfecting a ram which will be used in drawing the charge. Instead of breaking the coke in drawing it out, as is done with beehive ovens, the entire charge comes out intact, a body of coke 30 ft. long, a trifle less than 4 ft. wide and about 24 in. deep. The oven ignites quickly and retains practically all the heat of the previous charge.

Coal Fields of Controller Bay, Alaska

The Controller bay region, Alaska, is one of special interest, because of its extensive coal deposits, the product of which is of excellent quality. Since 1903 the United States Geological Survey has been making investigations in this region. G. C. Martin, who has directed the work each year, spent two and a half months of the past season in that district and completed the work that had been planned.

The coal of Controller bay has thus far failed to reach the market because of the lack of transportation facilities. The principal developments in this region during the last summer consisted of work upon tunnels driven for the purpose of cutting the coal at great depth and of surveys for railroads and harbor improvements. These surveys were carried on by three separate interests, each of which contemplates the construction of a railroad into the interior by way of Copper river. One of these railroads is already begun. From what will be its terminus on Cordova bay it is reaching out toward the coal fields by a branch from the Copper river crossing.

Coal in Nova Scotia

The difficulty between the Dominion Iron and Steel Company and the Dominion Coal Company remains unsettled, though negotiations between the directors at Montreal resulted in a temporary arrangement, by which the Steel Company, in addition to coal obtained from other sources, will continue to purchase coal from the Dominion Coal Company, paying the prices at which the coal is supplied to other customers. They will require from the Dominion Coal Company 45,000 tons per month for two months and 75,000 tons a month thereafter. The Steel Company does not relinquish its rights under the contract, the validity of which will be determined by the courts, and will endeavor to hold the Coal Company responsible for the loss incurred and the difference between the contract price and that now paid. One of the blast furnaces was started Nov. 13 and the rest of the plant is expected to be in operation in a few days.

The De Bavay plant at Broken Hill, N. S. W., is producing zinc concentrate of high grade, while the tailings are low in zinc, indicating a high percentage of recovery. An experimental treatment of nine tons tailings gave three tons of zinc concentrates, assaying 48.6 per cent. zinc and 6 per cent. of lead. The tailings contained 0.7 oz. silver, 0.8 per cent. of lead, and 3 per cent. zinc.

COLLIERY NOTES

Details in the Operation and Development of Anthracite and Bituminous Mines

In excavation work it is common practice to consider that 24 cu.ft. of comparatively dry sand, or 17 cu.ft. of clay, will weigh a ton. Also 1 cu.yd. of earth before removal will occupy 1½ cu.yd. when dug.

The use of oil for fuel in Alaska is fast increasing, as a number of mines throughout the region have abandoned the use of coal and installed oil-burning apparatus. The great Treadwell mines on Douglas island have recently installed an oil plant, which will consume more than 700 bbl. a day.

All important foundations for buildings should go down below frost line. This depth, in States like New York and Pennsylvania, is considered as 4 ft. Foundations started above frost line are subjected to alternate freezing and thawing of the earth, which tends to throw the walls out of plumb.

Tarred paper, or roofing felt, as it is called, should be laid under all sheet-metal roof work and gutters on colliery barns, or other mine buildings. This lining not only lessens the interior heat in summer and excludes cold in winter, but acts to protect the under side of the metal from moisture and deleterious vapors.

One of the objections to the use of bar screens is due to the fact that long flat pieces of coal slide through between the bars, and a good separation is not effected. Bar screens will be found to act most satisfactorily when the bars are given both a horizontal and vertical motion. The bars in the screens should not be placed on too steep a grade, for by doing so the coal is considerably broken, and the screening is imperfect.

In construction work where cement is to be used, the superintendent should see that the dry cement is uniform in color and entirely free from streaks, which indicate impurities or imperfect grinding. The color may vary from a light to a dark gray. The ideas advanced that it should have a biting taste, a greasy feeling, or a yellowish tinge, are all erroneous. In case a barrel is broken open and the cement is found to have partly set or caked around the edges, care should be taken to use only the free cement and discard all that appears affected.

In testing lime that is intended to be used for building purposes, it is advisable to break open a sound barrel or two, and select several lumps at random, immersing these pieces in water. If some of the lumps remain inert, and then slake slowly, leaving a hard center, this action indicates that the lime is underburnt, and if used in building, would continue to slake, causing the mortar to crack. Overburnt lime is also objectionable, as the lumps are hard and resist the action of water, failing to slake readily. A good lime shows action immediately, gives forth a hissing sound and a white vapor arises.

A by-product coke-oven plant consisting of 100 ovens should produce about 10,000,000 cu.ft. of gas each day. At one plant it was found that 27 cu.ft. of gas were required to generate one horse-power per hour in a gas engine. Further statistics that have been gathered along this line show that when dry coal is charged into a by-product oven the actual results are as follows: Coke, from 65 to 76 per cent. by weight of the coal charge; gas, from 10 to 12 per cent.; tar, from 2 to 5 per cent.; crude ammonia liquor, from 5 to 6 per cent.

Practical engineers are turning their attention to more modern methods for lining shafts. Present practice favors the use of concrete or brick, and suc essful results have been obtained from both these materials. Brick designed for this purpose should be made of a clay that is rich in alumina and thoroughly ground in a mill. The brick should emit a metallic sound when struck, and should be fairly hard; but when subjected to excessive heat, they present too smooth a surface, and the mortar does not readily adhere. It is the custom to consider that 1000 brick will build 3 cu.yd. of masonry.

In selecting the site for an important mine building, it is essential that the nature of the subsoil be determined. In ascertaining the quantity of rock and dirt to be excavated, it is necessary to make soundings from which to form the basis for an estimate. In general cases when the cut is only of moderate depth, a long steel crowbar and heavy sledge hammer may be used. The bar should be driven at intervals of 10 ft. each way, and down to the depth required for the excavation, or until solid rock is encountered. In cases where more accurate information is desired for a heavy structure, it is usual to bore the holes with an augur operated by hand.

When a subsoil is unstable, so that in building a foundation it is necessary to have a large bearing surface, timber is often used as a footing for such a wall. To prevent rotting, the timber is sometimes charred on the outside and in other cases it is coated with asphalt; these precautions, however, are unnecessary if the ground is wet, for the timber will not then decay. The best method for building such a footing is to dig a trench the desired width, and then use 3x12-in. plank of the proper length. The bottom planking is laid crosswise, the second layer lengthwise, and the third layer is again placed transversely. The stone footing rests on top this last layer of planking.

With all of our knowledge concerning the chemical nature of coal, we are still ignorant concerning the manner in which the chemical elements are combined. Our analyses show us in what proportion the substances that go to compose the fuel are present, and it is from these chemical researches that we are led to believe that coal has in some complex manner been formed from vegetable matter. An ordinary piece of wood contains about 50 per cent. carbon, 6 per cent. hydrogen, 43 per cent. oxygen, and 1 per cent. nitrogen. A good grade of semi-bituminous coal will contain 82 per cent. carbon, 5 per cent. hydrogen, 13 per cent. oxygen, and 0.8 per cent. nitrogen.

Some trouble might be avoided in mine construction work, if superintendents would exercise more care in selecting a proper quality of lime. Common mortar for outside brickwork should be made with lime having less than 6 per cent. silica and alumina. When lime is intended for use in damp situations, it is called hydraulic and should contain at least 15 per cent. silica and alumina, so that it will slake slowly and harden under water. To determine whether a lime has hydraulic properties: take two parts clean sharp sand, one part lime, and make into a stiff mortar by continual working until all streaks disappear; form this mortar into a cake and immerse in water. After 24 hours, if the cake has perceptibly hardened, it may be inferred that the cement is hydraulic.

In fighting a mine fire, the ventilation should always be so arranged that the workmen are in the intake, and care should be taken to prevent any return air from doubling back and mixing with this pure air. If dams are built and the burning section is flooded, the superintendent should see that the water is left in the mine a sufficient length of time to permanently extinguish the fire. Often the water is pumped out too soon, and the coal again becomes ignited. This method of flooding a mine is very expensive, since the space from which a ton of coal has been removed will hold more than one-half ton of water; therefore a weight equal to one-half of all the material previously hoisted from this section of the mine has to be lifted again.

Metallics

The question of smoke from locomotives carrying a heavy load is still unsolved, but by proper stoking a large percentage of the smoke can be overcome.

Cages on which men are to be hoisted should always be provided with one or two overhead bars, at least one, to which the men can hold on. The cage should also be provided with guard chains to close in the sides.

The muckers in a mine cannot work efficiently with short-handled shovels, which they have to push under the muck piles by their back and arm muscles. They should be provided with long-handled shovels, which permit the work to be done by exercise of the leg muscles.

M. Arrivant reports to the Paris Academy of Sciences the result of experiments on alloys of tungsten and manganese. He succeeded in obtaining seven alloys, varying from 12 to 60 per cent. tungsten. These were not stable, however, for treatment with acid always left a residue of pure tungsten.

At the present time St. Louis has 983 manufacturing concerns and other plants that are using smoke-consuming devices, the character of which is as follows: 550 steam jet and air blast; 264 down-draft furnaces; 50 fire-brick arches; 19 automatic stokers; 74 have changed to electric power; 26 burning smokeless fuel. These plants contain from one to 30 boilers each.

Firemen are frequently responsible for smoking chimneys, by the failure to use properly the smoke-consuming device in connection with proper stoking. A modern and good smoke consumer is worthless if it is not handled intelligently by the fireman. It is also a fact that firemen do not take kindly to new ideas which exact care or compel labor beyond the routine measure.

The velocity of the fan tips or circumference of the fan wheel which is necessary to produce a given velocity of flow through a properly shaped outlet within the capacity of the fan, is substantially equal to the velocity of the flow. If, therefore, the peripheral velocity of a given fan is known, the resulting pressure for the production of velocity through an outlet of proper size and shape may be readily calculated.

The smokeless condition of Berlin is ascribed to the preponderant use of smokeless fuel, in the form of coke and briquets, the skilful, scientific construction of boiler furnaces and chimneys, and finally to the high standard of skill taught and enforced among firemen who stoke furnaces with coal for steam and other purposes. Before a man can assume such a charge in Berlin he must be taught the theory and practice of economical, scientific firing.

The mine superintendent who permits ore to be shot down upon a muck pile on rough bottom displays a carelessness with respect to the little economies in mining, which in the aggregate constitute much of the difference betwen cheap economical mining and costly careless work. If he himself will try shoveling for an hour or so, even for a few minutes, he will appreciate how much advantage there may be in having a good floor under a muck pile.

Tantalum has been hammered into sheets, which are extremely hard. Sir William Crookes, F. R. S., states: "A hole had to be bored through a plate of this metal, and a diamond drill was used, revolving at the rate of 5000 r.p.m. This whirling force was continued ceaselessly for three days and nights, when it was found that only a small depression 0.25 mm. deep had been drilled; and it was a moot point which had suffered the more damage—the diamond or the tantalum."

In every stope there should be a ladder of convenient length to be used to give the men access to the backs, which ladder can be moved as required. Many superintendents seem to think their men are like goats in ability to scale and descend steep craggy, rock faces. If a ladder be available in the stope, the dislodging of loose rock in the roof, which may fall with disastrous results to some unfortunate miner, is much more likely to be properly attended to than if somebody has got to remember to send a ladder down from the surface, or obtain one from a different part of the mine, which by good luck may possess it.

In operation, the peripheral discharge fan sets in motion the air within it, which, acting by centrifugal force, is delivered tangentially at the outer circumference of the wheel. Air rushes in at the axial inlet to fill the space between the blades, in which there is, by the centrifugal action, a tendency to form a vacuum. The degree of this vacuum is dependent upon the circumferential speed of the wheel; and the velocity of the air discharged through an outlet of proper size is substantially equal to that of the circumference of the wheel. The fan case thus virtually becomes a reservoir from which the air escapes through the outlet.

To ascertain the exceptional property of hardness possessed by tantalum, some interesting experiments have been made on a remarkably pure piece of metal. It could be cut with a file made of very hard fine steel, but the file suffered considerably. A very hard steel chisel, with an edge 4 mm. wide, was blunted under the first stroke of the hammer. Two drills were made of very fine grained cast steel, tempered in mercury, one of the ordinary shape and the other triangular; with the first it took seven minutes to drill through a plate 1 mm. thick; and with the other, constantly bathed with turpentine, 10 minutes. In both cases the edge of the tool was destroyed.

In the development of a mine it is careless practice to open winzes or mill holes from the middle of a drift. They should be started from an offset. Even then, they should be provided with a guard rail, and there should be stringent regulations to insure that the rail be kept down when the winze is not in use. Old winzes opening into the middle of a drift should be securely floored over. If such a winze is still in use and it be impossible to protect it by means of a guard rail or trap-door, a light should always be kept burning at that place. Loss of life, or any kind of accident, that occurs through men falling down improperly placed and unguarded winzes is morally criminal on the part of the superintendent of the mine, and the State laws should cause him to suffer for it.

In the application of the Huntington-Heberlein process at the works of the Sulphide Corporation, at Cockle creek, New South Wales, the ore after partial roasting is mixed with limestone crushed to pass a 10- to 15-mesh sieve. The limestone "may be added before or after roasting." The proportions are so adjusted that the charge will contain 6 to 9 per cent. of lime and 25 to 50 per cent. of lead. If silica is not present in the ore, it also is added. If too much lime be present, the resulting product will crumble. Thorough mixture is necessary; otherwise there will be lumps of material that have escaped action and the pots will volcano, or the gases will spurt through orifices instead of bubbling evenly through the charge. The desulphurization of a charge requires about five hours. The temperature in the pots rises to at least 1000 deg. Centigrade.

The beginning of the zinc industry in British Columbia was practically contemporaneous with its origin in Colorado, the first shipments having been made in 1899. These were chiefly from the Lucky Jim mine, near Sandon; a few tons came from the Bosun mine, near New Denver. The Lucky Jim mine, between June 30 and November 30, 1899, shipped 1728 tons of ore, assaying from 30 to 52 per cent. zinc. Most of this was ore assaying about 50 per cent. zinc, 1 to 2 per cent. lead, and less than 5 oz. silver per ton, but some of it was mixed ore assaying 30 to 35 per cent. zinc, 20 to 30 per cent. lead, and this was generally rather high in silver, containing 25 to 30 oz. per ton. The exportation of zinc ore proper from both the Lucky Jim and Bosun mines amounted to 1600 tons, which went partly to Antwerp, and partly to Ellesmere Port, on the Manchester ship canal, where the Smelting Corporation, Ltd., was exploiting the Fry process of smelting, an undertaking which subsequently met with disaster.

THE ENGINEERING AND MINING JOURNAL

Issued Weekly by the

Hill Publishing Company

505 Pearl Street, New York.

London Office: 20 Bucklersbury, London E. C., Eng.

CABLE ADDRESS "ENGMINJOUR, N. Y."

Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Canada, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.

To Foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

Copies are on sale at the news-stands of the following hotels:—Waldorf-Astoria, New York; Brown Palace, Denver; and the leading hotels in the principal cities.

Entered at New York Post Office as mail matter of the second class.

During 1905 THE ENGINEERING AND MINING JOURNAL *printed and circulated* 454,250 *copies, an average of* 8735 *per issue. Of this issue* 8000 *copies are printed. None sent regularly free. No back numbers beyond current year.*

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*Illustrated

The Smelter Smoke Question in Utah

The recent decision by Judge Marshall, of the United States Court at Salt Lake City, granting an injunction against all the smelters in the Salt Lake valley on the ground that their operation is injurious to other interests, especially the agricultural, because of sulphurous gas discharged into the atmosphere, is a serious matter. Judge Marshall held that the smelters could not escape injunction because of the benefits arising in many respects from their operation, which could not be considered as an offset to the damage inflicted by them.

The smelters of the Salt Lake valley, among whom are included the American Smelting and Refining Company, Utah Consolidated, Bingham Consolidated and United States Smelting Company, are now confronted by a condition, not a theory. According to the terms of the injunction they may not smelt any ore containing more than 10 per cent. of sulphur, by which we understand that no ore of higher sulphur content may be roasted, and similarly no ore, or rather furnace charge, of higher sulphur content may be smelted directly in the blast furnace. The enforcement of this injunction has been postponed six months by appeal by the smelters, but in the meanwhile plans must be seriously considered for readjusting their practise on a new basis. However, this is not a new matter, some action having been anticipated for a long time, and elaborate experiments for the neutralization of the sulphurous acid having been conducted by several companies.

It is certain that the recent troubles over this question which have been experienced by smelters not only at Salt Lake, but also in California, at Butte and elsewhere, will bring to a head technical investigation and legislation upon this subject. Evidently we are coming to the point, even in some of the smelting districts of the West, where some such requirements as exist in Europe must be conformed to. The requirements are often extremely onerous, even in Europe, and if enforced in some of our Western districts would not only be more onerous, but also might be prohibitive. The great problem is to fix or absorb the sulphur in some way that our particular conditions will permit.

At the present time we know of only three ways of overcoming the sulphur nuisance. One is the dispersal of the gas so high in the air that it will be diluted so much that it cannot possibly cause trouble; the second method is neutralization with milk of lime, which is a feasible though costly and rather troublesome process; the third method, which is the one generally followed in Europe, is the manufacture of sulphuric acid. Unfortunately, if all the sulphur burned at Butte and Salt Lake City were converted into sulphuric acid, no one would know what to do with the acid.

A fourth expedient is the performance of the desulphurization at places where no one would object. There is talk now of erecting roasting furnaces in Bingham cañon, where the sulphur would be no particular nuisance. However, that would be only a partial solution of the problem and would not help the case of the large ore supply from outside districts, which some of the smelters of the Salt Lake valley receive, all of them, with the exception of the Utah Consolidated, having become substantially custom plants, as the works of the American Smelting and Refining Company and United States Smelting Company are essentially. The ideal solution is the employment of the sulphurous gas for some useful metallurgical purpose. The question is one which will deeply engage the attention of metallurgists in America. The first step is to study carefully the elaborate investigations made in Europe, as to which there is a considerable literature.

The Nipissing Affair

The withdrawal of the Guggenheims, at a cost of $1,500,000, from their contract to purchase 400,000 shares of the stock of the Nipissing company at $25 per share is one of the most extraordinary events in mining finance. Naturally, the announcement of their intention led to a disastrous slump, not only in the price of Nipissing shares, but also in those of the other Cobalt companies, and it indeed has unsettled the whole mining boom, so far as trading in the stocks is concerned.

The absorbing question of the day is the reason for the Guggenheim action. It is not too much to say that the explanation that titles might be defective is not seriously regarded. It is inconceivable that mining operators of the shrewdness and experience of the Guggenheims should have embarked in an en-

terprise of the magnitude of this one without making in advance an adequate and satisfactory examination of the titles. Nor do we believe that the Guggenheims, whose operations have always been as creators and developers of industrial enterprises, not as mere speculators, have done this thing to manipulate the stock market, losing $1,500,000 from one pocket to gain more than that in the other, or even merely to recoup the loss.

It would appear that there is only one other logical explanation, namely that the Guggenheims had come to the realization that they had embarked in a bad venture and that it was preferable to lose $1,500,000 now than more later on.

There is no question that they contracted to pay an immense price for property that had not been extensively developed according to the accepted principles of mining investment. The Nipissing veins are of exceptional character. However, the price to be paid made the whole thing a great gamble, a venture of character quite different from what the Guggenheims, and Mr. Hammond, had previously gone into, which was the cause for great surprise when the deal was first announced.

As to the effect this affair will have on mining at Cobalt remains to be seen. It may be that recent developments in the Nipissing mines, known only to the insiders, have led to the conviction that the veins do not extend to any great depth. There have been rumors to that effect, but we have been unable to verify them. However, there is no doubt that the price the Guggenheims were going to pay was too high.

Lake Iron-ore Sales and Prospects

Some astonishing sales of Lake Superior iron ore for 1907 have been made this week; surprising in the light of the base fixed so recently. The product of two or three Mesabi mines has been placed at from 8.6c. per unit, natural, for a bessemer, to 7.8c. per unit, for a non-bessemer, at Lake Erie ports. A Mesabi non-bessemer running under 51.50 per cent., and selling at $4, is a sight that should draw tears to the eyes of those who are still delivering, under contract, a better ore, and a bessemer ore, at from 4 to 4.5c. per unit. The sales referred to are of sufficient volume to be fairly indicative of the market, and are not exceptional ones. In consequence of present prices and the insistent demands of furnacemen, Lake Superior independent ores are probably closer sold up to-day for 1908 than they were at the opening of navigation last spring for 1907.

In considering the possibility of a material increase in ore tonnage from Lake Superior next year several facts must be carried in mind, the weight of which has not, perhaps, been properly appreciated. In the first place, there will be no increase over 1906, except from the Mesabi. Old ranges are up to speed now, and of the class of ores where a gain might be made, little will be used. On the Mesabi are three railroads. The Duluth & Iron Range is at its limit at 8,000,000 to 9,000,000 tons for the season. The Duluth, Missabe & Northern, which moved 11,000,000 tons this year, is prepared to forward 13,000,000 next season. The Great Northern, with over 6,000,000 this year, will do well if it brings the total to 8,000,000 in 1907. These roads can probably put out 3,500,000 to 4,000,000 tons more than they have done this season. Of course, there is no question as to vessel capacity. The altruism of the independent ship-owner, controlling no tonnage, but continually building boats in which to carry it, is as refreshing as it is short-sighted. That it has paid well so far is no argument; conditions have changed. But new mining will be limited by the capacity of steam-shovel shops, and by the labor market. The works building steam shovels are few and are filled up; contractors likewise are fully employed, while the mine operators who carry on their own strippings, have plans laid out for big jobs, many of which will not mature for years. The labor market needs no remark, in the light of the shortage which has caused so much complaint this year.

Depreciation of Smelting Plants

The communication of Mr. Boggs, published in this issue, as well as the admirable article by Dr. Raymond, published in the JOURNAL of Nov. 17, lays especial emphasis upon the necessity of an ample allowance for depreciation due to the advance of the art. As an abstract proposition, we think that this principle must be admitted. We have no doubt whatever that Mr. Mathewson, whose communication was the basis of this discussion, would fully agree with that principle.

However, agreement upon an abstract principle is one thing, and agreement upon its practical application is another. The prime question in this case is not whether an allowance should be made for such depreciation, but how much of an allowance should be made. Dr. Raymond supports in a masterly way the theory of depreciation through advance in the art, but offers no specific rules for guidance. Mr. Boggs thinks that it is impossible to fix any definite limit for the life of a plant. Technically he is, of course, correct; it is impossible for anyone to foresee the future of any particular plant.

Inability to foretell the future, however, applies to all things human, and yet it is always necessary to forecast the future, to the best of our ability, which we do through generalization based on previous experience. So in the case of smelting and other industrial plants, we cannot say that a particular plant will continue in active operation through a period of 10 or 20 years, but we may say, or rather ought to be able to say, that under certain conditions it may be properly estimated that a plant will continue in successful operation for a certain period. This is a question which comes before every company which is planning a new plant, before every engineer who is called upon to estimate upon such an undertaking, and before every manager of an existing plant, who needs to know whether he is writing off sufficiently from the gross profits to take care of the depreciation, whatever be the class or cause.

It is the recording of experiences in connection with past metallurgical plants, just as Mr. Boggs has mentioned the case of the Consolidated Kansas City Smelting and Refining Company, which if presented with proper detail, and subjected to analysis, will furnish the basis for generalizations that will be useful in the formulation of plans for future plants. It is improbable that the experience of any particular plant will be precisely duplicated in plants not yet built, but the average of past experience in various lines may furnish an approximation to the average of the present and the near future. Our only guide in forecasting the future is the experience of the past. The immense importance of the subject of depreciation of plants has been ably expressed by Dr. Raymond. It is to be hoped that the discussion will be continued.

Tricks in Ore Selling

BY DAVID WALLACE

In the "good old times," before the "benign influence" of the "Trust" had become so all-pervading and powerful, the competition between ore buyers was very keen, not to say unscrupulous. I have thought it might be interesting to relate a few instances of the "tricks of the trade" as practised by both the seller and buyer, the occurrences being chiefly in Mexico. There were many legitimate methods adopted by miners and ore dealers to obtain better prices for their products, such as mixing two or more lots of ore of different classes in order to "bring down" the silica, zinc and sulphur, or to "raise" the contents of gold, copper or lead to a point above the limit unpaid for by the smelters. The questions also of obtaining a suitable flux, whether assays should be made by scorifier or crucible, "feathering," etc., are quite within the seller's right, in order to secure "high" results. Such matters as these need not engage our attention here. It will readily be conceded by those conversant with the business, that constant watching is required on the part of the buyer to see that he does not become the victim of duplicity on the part of the seller.

It was customary in the shipments of a certain small dealer to make up a carload of two or more lots of entirely distinct kinds, consisting of low-grade, coarse rock, and high-grade, fine sand, the whole to form one lot at the sampling works, in order to secure carload rate. The shipper gave instructions to have shipment sampled by dumping in one pile and cutting out every third shovel. This method would have resulted in a larger proportion of fine sand being taken with each shovelful, consequently enhancing the value of sample considerably as compared with lot. In this case, however, the purchasing agent ignored the request of shipper, and made separate piles, cutting out a third from each, after which the whole of coarse and fine was passed through the crusher and rolls prior to a thorough mixing, ringing, coning and quartering.

At a certain mine, since then not unknown to fame, in its early days a slight variation from the above was made. The terms of contract stipulated that all sampling be done at the mine by seller's men (a very unwise procedure, to say the least). Lots were made up into piles averaging about a carload in size, and to all appearance, uniform, being a fine earthy ore of about 600 oz. silver and 10 oz. gold per ton. The buyer was represented by a reliable sampler who watched the whole operation from the commencement to the final sealing of pulp samples. It has been said that South Africa, in relation to the officers of the British Army, was the "grave of many a reputation." The same remark could have been applied to this particular mine, so far as the representatives of the buyer were concerned.

Great losses were incurred by the buyer, for the re-sampling at the smelter invariably showed much lower results. Notwithstanding that several men were sent to replace each other, the cause of the differences remained for a long time undiscovered. When the secret was eventually divulged, it resolved itself into a very simple problem, being only the manipulation of the shovels when throwing up the ore from the "ring" to form the "cone," and "spreading" out the latter ready for quartering, the whole object in view—which was attained—being the concentration of the coarser particles of ore into two opposite quarters, these being left on the floor. This operation was repeated until ready for the grinder, but in such a manner as to pass unnoticed by an onlooker, unless previously warned—the outcome of this method was an increase of from 2 to 5 per cent. in the assay.

It is not many years ago that an agent, representing a large smelter, had an 80-ton lot of ore "salted" to the amount of $7000. The ore was received at the agency in the usual manner, weighed, sampled, assayed and liquidated. Upon re-sampling at the smelter, a large discrepancy was found in the assay figures. Investigation disclosed the fact that the "bucker" (who happened to be a Mexican) had been bribed, and that the method of "salting" consisted in some "fine dust" falling from his *sombrero* on his bucking-board, as he occasionally shook the perspiration from his face.

An unsuccessful attempt to get the better of a smelter was made some time ago in the following manner: The "party," after having settled all details as to rates and conditions at the office, was shown through the works. He appeared to be particularly interested in the system of sampling, among other things noticing that the laborers, in taking every tenth shovel for the sample in the car, had a marked tendency to gravitate toward the center of the car. Not many days passed before the first shipment of his ore arrived and, acting upon instructions received for this shipper, the sampler cut out the sample from the car as usual, but also had the whole lot dumped on the sampling floor and resampled. This test proved conclusively that the center of the car had been tampered with by a liberal distribution of "suphurets" on the ore in that location.

At another smelter a man succeeded in his nefarious scheme of raising the assay results at the expense of the purchaser. Shipments were made in lots, comprising five carloads each lot, the ore being low in gold and silver. Upon receipt of each car, a twentieth was taken for the sample, which was placed in a bin until completion of the lot. Some time elapsed between the arrival of the fourth and fifth cars and, during the interval, the owner presented himself at the sampler's office to make inquiries, etc.. Being very agreeable, offering the employees a cigar or two, he was allowed to "run round" alone. Before leaving, he casually looked in the bin containing his sample, having been informed the lot number. Upon arrival of the last car, the sample was taken in the absence of the owner and liquidation made on the results obtained. This went on for a long period. By an oversight on the part of the sampler, the wrong lot number of the bin was given him one day, and on this occasion the results showed such a remarkable depreciation that a strict inquiry was demanded, resulting in the detection of the shipper "salting" his sample in the bin when making his usual visit.

What amounted to deliberate stealing took place at another camp. Under terms of contract the owner agreed to haul the ore from the sampling works to the railway station, a distance of 10 miles, after the lots had been liquidated. The hauling was done by burro train, the ore being sacked but unsealed, the latter precaution not being taken because the ore was shipped in bulk by railroad. Between the sampling works and the railroad station there was a wild stretch of country, lending itself to purpose of robbery in transit, which was availed of by the freighter. Only two or three sacks were changed in each lot, thus making it next to impossible to check up differences at the smelter, especially inasmuch as the ore was similar in appearance to country rock. The slight differences were attributed to the crude manner of sampling at the receiving point until the actual cause became known.

Smelting Rates in Nevada

It is reported that the American Smelting and Refining Company, in view of the rapid completion of several large gold mills at Tonopah and Goldfield, has decided to make a cut in its reduction charges. The smelting rate on silver ore has been made uniform, the charge being established at $5 on $14 ore or under; on ore between $14 and $20 the sampling charges are $6 a ton, and between $20 and $25 the charge will be $6.50. From this point on, on the high-grade ore, the rate increases. On ore carrying from 0.2 to 5 per cent. copper the allowance has been increased from $1.50 per unit of 20 lb. to $2.25, an increase of 50 per cent. On ore carrying from 5 to 10 per cent. of the red metal the rate has been increased 75c. per unit, from $1.75 to $2.50, and on all ore carrying in excess of 10 per cent., the allowance has been advanced from $2 to $2.75, a gain of 37.5 per cent.

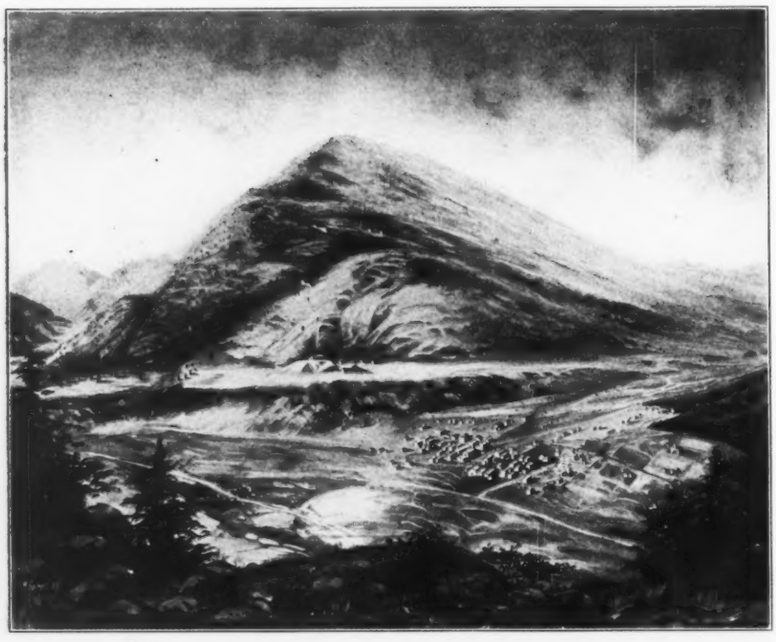
The antimony mines of Corsica are now being worked again, but it will be some time before any important quantity of ore is produced. The production in 1904 was 128 tons, all of which was from the Meria mine.

THE PALMER MOUNTAIN MILL

A New Electrically Operated Stamp Mill in Washington

BY F. F. COLEMAN

The Palmer Mountain Tunnel and Power Company is rapidly completing preparation for the installation of a 100-stamp mill near Loomis, Okanogan county, Wash. The mill is being constructed by the Traylor Engineering Company at Allentown, Penn. The Vancouver, Victoria & Eastern Railway is extending its line toward Loomis and will soon be within 12 miles of the town, the remaining distance having to be traversed by wagon. In the course of the development of this company's property, of which John Boyd was formerly owner, and is now manager, the Toats Coulee creek has been dammed and an electric power station with a 750-h.p. generator has been erected. The entire operation of mining, hauling and milling will be done with power from this plant, besides lighting the town of Loomis.



PALMER MOUNTAIN, WASHINGTON

The mine tunnel has 9x9 ft. dimensions. Its entrance is from a natural plateau overlooking the town of Loomis at the foot of the southwest slope of Palmer mountain. The mill will be built near the tunnel mouth convenient for the delivery of ore directly into the bins, of which there are four. A belt conveyor, 18 in. wide and 91 ft. long, runs alongside the ore bins, with its discharge end in the crusher house, and is fed by four plunger feeders.

CONVEYING SYSTEM

The plunger feeders are built of cast iron with openings 18x15 in. The plungers run on 4-in. rollers, and are actuated by heavy, variable-throw eccentrics, whose maximum throw is 3 in. This variation is accomplished by double eccentrics, one working within the other. The feeder openings in the bins are 36x30 in. The hoppers are of No. 10 steel, and are lined with ⅜-in. steel plate.

SAFETY GATE, PALMER MOUNTAIN FLUME

The belt of the 18-in. conveyor has rubber ⅛ in. thick on the face and edges. The tail shaft has 24 in. of travel for taking up slack. The head shaft is provided with fast and loose wood-split pulleys, 30x6 in. each, and with ball-and-socket capillary oiling boxes. Between head and tail shafts, 18 sets of troughing rollers are placed. At the delivery end, the ore falls into a hopper, from which two chutes lead it to two Blake crushers of the "Heavy Duty" type with jaws 15x24 in. The jaw plates are of chilled iron. Each crusher is driven by a 42x13-in. pulley bolted to one fly-wheel.

The chutes to the crushers, those from the crushers to the conveyor, which carries the crushed ore away, and those from this conveyor to the elevator, which takes the ore to the stamp mill bins, are all lined with ¼-in. steel plate.

The conveyor which receives the ore from the Blake crushers has a 14-in. rubber-faced belt. This conveyor measures 21 ft. long, and has four sets of troughing rolls. It delivers the crushed ore to a bucket elevator, which in turn takes it to the stamp-mill battery bin. The elevator measures 57 ft. between centers and carries 70 malleable-iron buckets each 16 in. long and 7 in. wide. As the stream of ore is delivered from the elevator to the mechanism which distributes it throughout the length of the bins, a 48-in. Vezin sampler, working horizontally, cuts out samples. The sampler has two scoops, and is so designed as to cut out one-tenth of the stream with one scoop, or one-fifth when both are in use. Ore cars carry the samples to a separate bin. From there they are drawn out to a dividing floor where, after thorough mixings, working samples are taken out for tests.

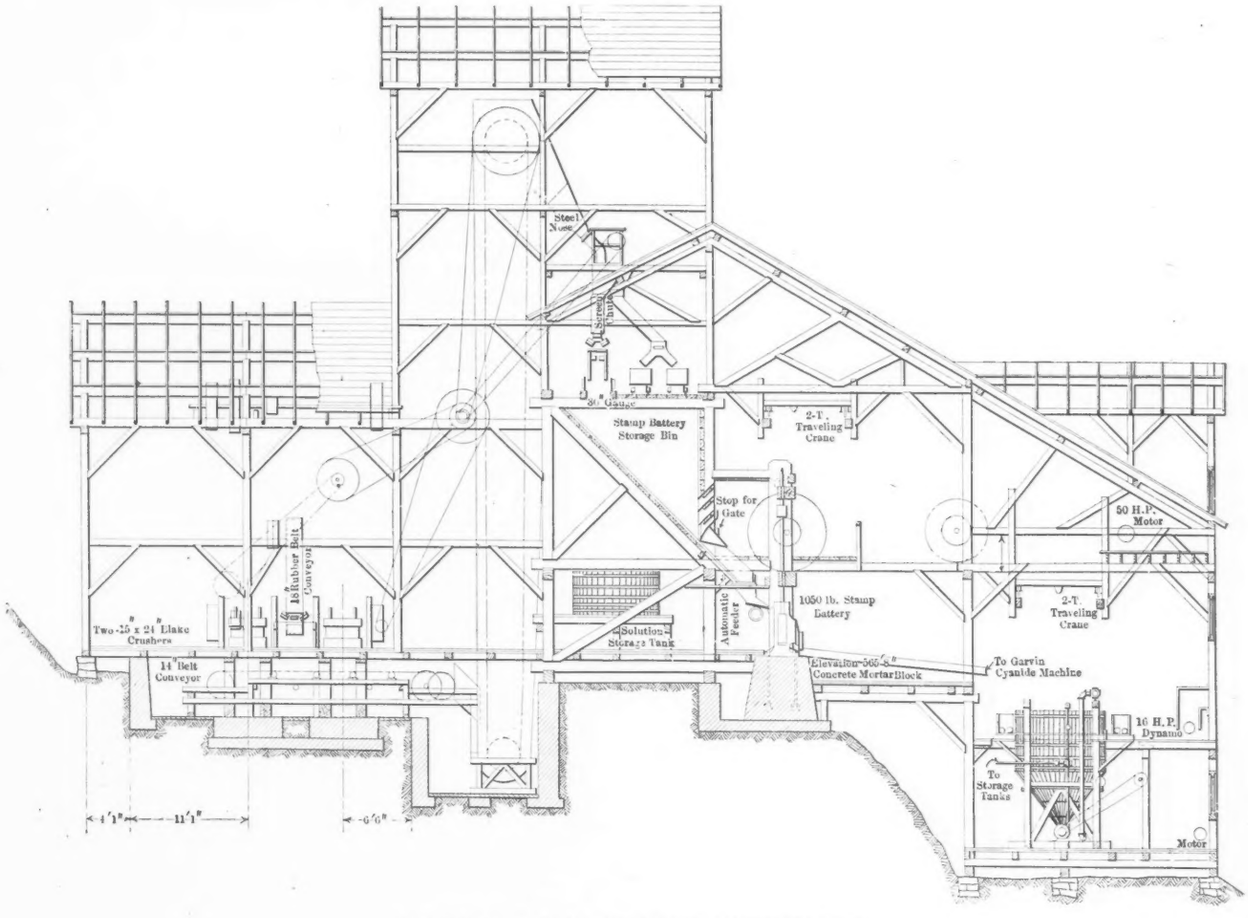
BIN DISTRIBUTOR

The mechanism for distributing the ore in the battery bins is interesting. The 100 stamps are set all in a line in batteries of ten, with spaces of about 5 ft. between every two batteries to allow room for the driving pulleys and to give ready access to the rear. This makes the 10 batteries occupy a space 175 ft. long, and the bin extends the same distance.

A traveling conveyor is installed over the bin to distribute the ore. The ore stream is delivered just over the center of the long bin. The ore falls upon the belt of a horizontal conveyor which is 86 ft. long. This belt, with its head and tail point of the long bin, filling one half of the bin when the belt is going in one direction, and the other half when the motion of the belt is reversed. This belt is 14 in. wide and has 17 pairs of troughing rollers, eight pairs of return rollers, and three sets of side guides. Like the others it has rubber on the face and edges. The conveyor frame is built of 5-in. channel steel. The track is built of 12-lb. T-rails resting on timber string-pieces running over the framework of the bin.

From the bin, the ore reaches the batteries through 20 gates—one for each mortar. It is fed to the mortars by 20 hanging-type Challenge ore feeders. Each measuring 12x24 in. Over the entire length of the batteries runs a double track of 12-lb. T-rails, carrying a traveler, a trolley, and a two-ton chain hoist, capable of handling any part of the stamping machinery. The rails for the traveler are 7½ ft. apart. The traveler spreads over this, having two wheels at each end, 4 ft. apart, and carries, running across it, a 9-in. I-beam, on the lower flanges of which a four-wheeled trolley is mounted. From a hook pendant from the trolley hangs the chain hoist.

The mortars are Traylor style B, cast with an extra heavy base and wide flanges to fit them for resting on a concrete foun-



TRANSVERSE SECTION OF PALMER MOUNTAIN MILL

mechanism, troughing and return rollers and electric motor for driving, is carried on a steel frame mounted on eight pairs of flanged wheels, which travel on a double track extending over the bin for its entire length. By a clutch connection, the motor that operates the conveyor can also be made to drive one set of the wheels on which the conveyor frame rests, so that it can be moved to any position relative to the bin beneath. The motor is reversible; the belt can, therefore, be driven in either direction and made to discharge at either end. It will be seen that, as the conveyor is about half the length of the bin, it can receive the ore from the elevator and deliver it at any feeder is provided with wheels and an overhead track, so that it may be readily moved to or from the mortar.

STAMP MILL

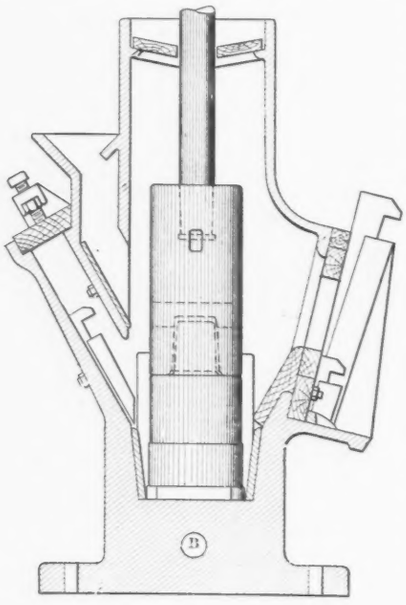
The stamp mills are of the Traylor type and are fitted throughout with chrome-steel dies, shoes, boss-heads, tappets, and self-tightening cams. The stamp stems are of forged mild steel and are tapered at both ends to fit the boss-heads, so as to be reversible. The guides are of oak.

Each battery is driven by a cam-shaft pulley built up of pine, 81½ in. diameter, with an 18-in. face. The stamps weigh 1050 lb. each and drop 105 times per minute. The battery posts are set on concrete foundation in cast-iron sockets, each dation. The bottoms are accurately planed. In mounting them a square of 6-ply elaterite is placed between the bottom of each mortar and the top of the concrete. Each mortar weighs 9000 lb. The bases are drilled for the foundation bolts by a templet, so as to make the lot interchangeable. The mortars are provided with side and end liners and false bottoms of steel, the bottom liners being in two sections for each mortar. The mortar bottoms under the liners are 12 in. thick. The mortars are single-issue with 40-mesh screens made of No. 36 wire. Two slots are provided in the overhanging lip of each mortar for removing chips or other matter which may lodge in them.

From the mortars the pulp passes through 20 cast-iron troughs to a 20-tank Garvin system cyaniding plant, which will be made the subject of a later description.

POWER DISTRIBUTION

The power for operating the mill is a 3-phase alternating current at 440 volts, with 7200 alternations per minute. Eight motors, varying in size from 10 to 75 h.p., furnish the power for the mill. The sizes and characteristics of the motors are as follows: Five 50-h.p. motors running at 514 r.p.m.; one 75-h.p. motor at 690 r.p.m.;



TYPE B MORTAR

one 30-h.p. motor at 850 r.p.m.; and one 10-h.p. motor at 1900 revolutions per minute. The 10-h.p. motor operates the traveling conveyor which distributes the ore in the battery bin. The 50-h.p. motors operate the stamp mills, each one running two batteries.

The power for the stamp mill is transmitted by belts from the motors to countershafts which run at 143 r.p.m., and from there to the driving pulleys of the batteries. Each battery is driven by a friction clutch pulley 30x16 in., mounted on the countershaft. This gives the mill operator entire control of the batteries, enabling him to stop or start any individual battery without interfering with the operation of any other part of the mill.

The 75-h.p. motor drives the Blake crushers and the conveyor that carries the ore from the bins to the crushers. The 30-h.p. motor drives the conveyor taking the ore from the crushers, the elevator taking it from this conveyor, the Vezin sampler, and the plunger feeders of the first bin. All shafting is hung in ring-oiling, ball-and-socket bearings. The belting is all of rubber, except that for the motor drives which are leather. All the shafting is of mild steel.

An Important Mine-drainage Plan

SPECIAL CORRESPONDENCE

The Lehigh Coal and Navigation Company has outlined a general scheme of drainage of its collieries in the Panther creek valley, between Mauch Chunk and Tamaqua, which will involve an expense of $700,000, and the construction of a total length of about 14 miles of tunnel. The Panther creek basin extends between the two towns named, and at Tamaqua the bottom of the basin is 1400 ft. below tide-level, and 2200 ft. below the level of the Schuylkill river. At Mauch Chunk the basin comes to the surface on Mount Pisgah, at a level of about 1400 ft. above tide and 200 ft. above the Lehigh river. The coal basin falls to the east, and the Panther creek valley falls to the west. It is proposed to drive the tunnel from high-water mark on the Lehigh river, near Mauch Chunk, a distance of 7500 ft. to a point of intersection with the Buck mountain, or one of the underlying coal seams. From this point a drainage gangway will be extended westward in one of the coal seams from which connection will be made with all the collieries now in operation on the company's property between Mauch Chunk and Tamaqua. The tunnel and gangway will have a descending grade to the Lehigh river of 0.25 ft. in 100 ft. The distance from the outlet of the tunnel to the western extremity of the drainage gangway will be about 12 miles. Five collieries will be placed above water level, and in five others pumping will be reduced vertically an average of about 360 ft. Owing to the thickness of the Mammoth seam and its steep pitch the mining of coal makes very large openings in the outcrop. The coal having been worked in the upper levels, the outcrop is now broken, and practically forms an enormous ditch on both sides of the valley for its entire length. In times of heavy rain large quantities of water reach the lower workings from the surface through this broken outcrop. The cost of pumping the water at different collieries varies, ranging from 5 to 10c. per ton of coal produced. It has been estimated that for every ton of coal shipped to market from the lands of the Lehigh Coal and Navigation Company, over 11 tons of water have to be taken out of the mines.

In times of unusually wet weather the quantity of water exceeds the capacity to handle it. The gangways become flooded, and work has to be suspended temporarily, causing a large loss of tonnage, and increasing the cost. As the mines become deeper the question of handling the water becomes more serious. Plans have been prepared by Baird Snyder, Jr., superintendent of the company, for the construction of the main tunnel, the drainage gangway and the connecting tunnels, which call for 24,000 ft. of tunnel and 54,000 ft. of gangway, making a total of nearly 14 miles. The total cost is estimated to be more than $700,000. It is believed that the direct saving at the present time in the cost of mining coal will be nearly $150,000 a year.

The California State Miners' Association

SPECIAL CORRESPONDENCE

The fifteenth annual convention of the California Miners' Association was held in San Francisco on Dec. 3—6, inclusive. President Tregidgo and Secretary Ensign have been at work energetically for some time making preliminary arrangements for the delegates. Following are the names of those on the program to present papers, with the subjects assigned to them: John Hays Hammond, "Smelting Interests in California;" Wm. H. Crocker, "Relations of Mining and Banking;" Rufus P. Jennings, "Mining and its Relation to State Development;" P. J. Van Loben Sels. "River Improvements;" Frank K. Short, "Oil Development;" John P. Young, "Gold Production and Coinage;" M. L. McDonald, "Greenwater Copper Dstrict;" J. I. Crowell, "Gold Mining in Inyo County;" Frank S. Gordon and Samuel McEathen, "Mining in Southern California;" Prof. S. B. Christy, "Mining Work at the University;" Frank Robinson, "Hydraulic Mining in Alaska;" G. McM. Ross, "Reduction of Copper Ores;" M. E. Dittmar. "Northern California Mines;" Charles G. Yale, "Progress of the Mining Industry in California;" Geo. L. Holmes and W. P. Hammon, "Dredge Mining;" J. H. G. Wolf, "Manhattan District;" W. A. Beard, "River Reclamation;" T. J. Nolton, "Mines in Siskiyou County;" James A. Jasper, "Gem Industry of San Diego County;" Major W. W. Harts, "Debris Restraining Works;" W. J. Burtnett, "Mining Development of California;" A. D. Foote, "Mine Timbering;" Edwin Letts Oliver, "Cyaniding;" Geo. Starr, "Mine Developments." Others addressing the meeting are Governor Geo. C. Pardee, Congressman W. F. Englebright, F. F. Thomas, and the presidents of the two universities.

According to a North Queensland paper, one of the most interesting sights of the Lightning Ridge opal field is a miner with only one leg, the other having been amputated above the knee. This man, who is fully 60 years of age, is working alone, and has sunk a shaft 40 ft. deep. He goes up and down, hand over hand, by means of a rope fastened at the top. He first lowers two kerosene cans into the shaft, then follows them down, and when they are filled with dirt he ascends, and draws the cans to the surface by means of a windlass. He continues this tedious process all day long.

Nipissing and Its Fluctuations

In the present mining-stock excitement in New York, the leading feature has been the rapid advance in the stock of the Nipissing Mines Company. This company, it was understood, had secured control of a large section covering some of the best veins yet discovered in the Cobalt district; it had been working these for some time, and began to pay dividends last July at the rate of 12 per cent. yearly. The company issuing this stock is a holding company, organized under the laws of Maine, and owning all the stock of the Ontario corporation in which the title to the mining property is vested. It was originally capitalized at $12,000,000, but this was afterward reduced to $6,000,000 in 1,200,000 shares of $5 par value. The stock is not listed on the New York exchange, but is dealt in on the curb, or outside market.

The stock came suddenly into prominence, and the curb eagerly pushed it forward, as the public seemed to accept it with favor. After the rise had already gone high, a further impulse was given to the movement by the announcement that the Guggenheim interests had taken an option on 400,000 shares of the stock at $25 per share. On this option the sum of $2,500,000 was paid. This seemed to certify the value of the property, and the advance was unchecked until, in the third week in November, a price of nearly $35 per share was reached, which meant a valuation of $42,000,000 for the property.

In the last week in November rumors began to be circulated that there was an uncertainty about the title to the property, and the quotation began to fall rapidly. On Dec. 1 the fall was accelerated by the issue of the following statement by the lawyers representing the Guggenheim interests:

"On Oct. 30 the Messrs. Guggenheim took an option from a number of gentlemen for the purchase of 400,000 shares of the capital stock of the Nipissing Mines Company at $25 per share. They offered a large portion of this block for underwriting to their friends at the contract price, receiving not a dollar for commissions or otherwise. They also intended to keep a large portion of the stock for themselves. On Nov. 1 they paid $2,500,000 on account of the purchase price. On making this payment they received for themselves and their subscribers 40,000 shares of the stock, leaving in the hands of the vendors 60,000 shares of the stock as a forfeit in the event that they failed to make subsequent payments.

"The second payment would have been payable today if they had concluded to proceed further with the business. They have now decided not to exercise their option with regard to the purchase of the remainder of this block of stock and have so notified the vendors."

In connection with this statement it was further announced that Messrs. Guggenheim had assumed whatever losses might arise out of this transaction, thus relieving their subscribers from all obligation, so that not one of their subscribers would lose a single dollar.

With regard to the title, an official despatch from the Ontario premier stated that there was nothing to impeach its validity, and that the government had not at any time contemplated proceedings to attack it in any way.

Notwithstanding this, the stock continued to fall, and on Dec. 3 reached $14.50 per share, closing at $15. The dealings were heavy, and the stock absorbed the attention of the curb for the time being. A point, to which attention may be called, is that local holders of the stock have not been affected by the fluctuations in New York, and have held their stock, apparently believing in its future.

Many references have been made in the JOURNAL to the Cobalt district, which is one of the most remarkable of recent discoveries. It is a region of narrow veins, extremely rich in silver, and carrying also nickel, cobalt and arsenic, in various combinations. The mining is necessarily speculative to an extraordinary degree, since it is impossible from the nature of the veins, to block out any considerable quantity of ore in advance. Exploration and extraction must go together. With narrow veins, most of them 12 in. or less in width, a great deal of dead work is necessary, making high costs of mining. The ore is complex, and is a smelting ore entirely, and a difficult one at that. With all these drawbacks, however, the veins have proved so rich that large profits are possible. At the same time predictions as to the future are hazardous. There seems to be no doubt that the Nipissing properties include many valuable veins; the question is as to their persistence in the future. The management of operations is in competent hands.

In this case, so far as the stock market is concerned, Nipissing seems to have been taken up as a convenient counter for speculation, and the violent fluctuations have had little regard to the real value of the property. For the reasons above briefly outlined, that is extremely difficult to determine—as is, indeed, the case with all the Cobalt properties. It can be said, however, that there is, at least, a fair chance for a great future in many of those properties; quite enough to warrant their continued and persistent exploitation.

The blast furnaces in the German duchy of Luxemburg in 1905 numbered 32, and they made 1,368,251 tons of pig iron, an average of 42,758 tons per furnace. They used 4,349,251 tons of native ore and 47,533 tons of imported ore; a total of 4,396,784 tons, or an average of 3.21 tons of ore to the ton of pig iron.

North Carolina Building Stones

The excellent report on building stones recently issued by the North Carolina Geological Survey—prepared by Thomas L. Watson, F. B. Laney and George P. Merrill—shows that North Carolina is well supplied with stone that is adapted to all kinds of building purposes and that its geographic position renders it easily accessible to the markets of the largest cities for building stone. The economically valuable stones include granite and its associated rocks; limestones and marble; serpentine; sandstones and quartzites.

This report shows the State to be well supplied with a great variety of building stone materials, particularly those of a granitic type. With the possible exception of Georgia, it is better supplied both as regards quality and variety than any of the other Appalachian States south of New England. This, taken in connection with the mildness of the climate, which permits a long season of outdoor labor, and the cheapness of labor, should result in the development of a very extensive industry.

Some stones of peculiar interest have been found in the State such as the quartz porphyry or leopardite found in Mecklenburg county, an attractive monumental stone which will undoubtedly become of considerable commercial value; another found in Davis county is the orbicular gabbro-diorite which is a most attractive stone for monumental purposes. Both of these stones were on exhibition at St. Louis and attracted a great deal of attention.

In Madison county occurs the unique and beautiful variety of granite known as unakite composed of yellow-green epidote, dull pink or red feldspar and quartz.

Cement Manufacture in Ontario

SPECIAL CORRESPONDENCE

The cement industry is being rapidly developed in Hastings county, Ontario. The Belleville Portland Cement Company is turning out 1000 barrels per day, and even with this output finds it difficult to fill orders. This company is preparing to install additional electrical power. The site chosen for the extensive works of the Lehigh Portland Cement Company is about half a mile east of the Belleville property. A branch line is being built by the Grand Trunk Railway to the site, where work will be commenced in the spring. The company has secured 800 acres on which there are abundant supplies of rock and clay. The plant, which will be the largest in Canada, will have a capacity of 6000 barrels a day.

CORRESPONDENCE

Discussions by Our Readers of Various Topics of Interest

Soapstone Paint

Answering the query of "P.C.D." in the JOURNAL of Nov. 24, 1906, I beg to offer the following extract from my note book.

Soapstone (steatite) as a pigment for the protection of iron, steel, wood and sandstone is a new departure of great importance.

The paints usually employed for protection of structures against atmospheric effects are themselves rapidly acted upon by the atmosphere. Soapstone, however, is not affected by heat, frost, air, gases nor acids and when mixed with any quick drying varnish of good tenacity and hardness gives to the surface to which it is applied an enamel-like finish that is both handsome and enduring.

Applied to wood, soapstone paint prevents rotting, and disintegration is arrested when it is applied to sandstone, or other soft stone surfaces. Applied to structural iron and steel work it thoroughly protects them and is especially valuable for the inside of steel ships, bridges, foundries and steel-frame manufacturing plants.

The paint if mixed with a good quality of varnish is light, flows easily and takes hold of iron and steel surfaces with great strength. It would seem that any varnish would answer as a vehicle for the steatite that would make an easy flowing paint when mixed with it. This is a simple matter of experiment.

W. A. DAWSON.

Freeport, N. Y., Nov. 28, 1906.

Electric vs. Air Drills

In the JOURNAL of Nov. 17, there appears a communication from me and a reply by Frank Richards, respecting the electric-air drill. I note from his reply that my question was not clearly understood. I do not doubt in the least Mr. Richards' statements in respect to the power of the blow struck by the drill, as I presume from the manner in which he writes that he is very familiar with the drill and the work which it will do.

My communication was brought out by a statement in his letter appearing in the JOURNAL of Oct. 13, which statement was as follows: "The drill piston starts with a big pressure behind it, due to the compression of the air in the cushioning of the return stroke." The question occurred to me as to what the result would be if the piston did not start with the "big pressure" referred to, but depending for its action entirely upon the air moved by the compressor. It appears to me that it would be rather difficult to get a hard blow simply by pumping the air from one side of the piston to the other.

My understanding of the construction of the drill as shown by the cut was that the outlets for air were at the extreme ends of the cylinder, but it appears from what Mr. Richards states that the rear opening to the compressor pipe is somewhere near the middle of the cylinder, in which case, the opening to the compressor pipe would be closed when the piston has made about half of its backward stroke, the air behind the piston being trapped and compressed during the remainder of the backward stroke. I would like to know if my interpretation of this is correct.

The reference to the regulating screw, back-head valve and pull-back valve, does not give sufficient information to enable one to understand just exactly how these parts are made use of in the actual operation of the drill. I would be glad if Mr. Richards will explain this.

Fully appreciating the great value of a rock drill which can be operated by an electric motor, and it appearing from communications which have been published, that the drill referred to has considerable merit, I am much interested in learning how the results have been brought about; therefore, my questions relate more to detail than to results, and I have replied to Mr. Richards' communication, as I presume from the nature of his article that he is thoroughly familiar with the details of construction and operation.

JOHN L. WAGNER.

Syracuse, N. Y., Nov. 20, 1906.

Depreciation of Smelting Plants

Referring to your editorial and Mr. Mathewson's letter on the subject of depreciation of smelting plants, in the JOURNAL of Nov. 10, I should say that within the limits set in his letter, Mr. Mathewson's allowance of 5 per cent. is amply sufficient. But is the probable life of the material used in construction the sole factor, or even one of the most important factors in determining the life of the plants as a smelting unit?

Your "Carnegie coefficient"—depreciation due to advancement in the art—is one that demands consideration. It is hardly likely that any violent change in methods will ever call for the immediate rebuilding of an entire plant, but it is certain that changes, enlargements, alterations, addition of auxiliary establishments, modifications of all sorts and kinds, begin almost with the inauguration of operations. These are not properly chargeable to repairs, nor, unless they directly increase the ultimate tonnage output, to capital. As they remedy defects in the first design, it would seem that there should be some method of charging their cost against that design.

Again a very important factor in the life of a smelter as an earner of dividends—and that is its only excuse for being—is its ore supply, and more often than not, of some particular kind of ore, and this is a matter on which other questions than variations in the output of mines enter. Changes in transportation rates, the opening of new lines of communication, etc., will work for or against any given smelter in ways that cannot be foreseen or provided for. For instance, the competition of Denver and Pueblo in 1884 or thereabouts, with the decrease in lead output in the camp itself, made Leadville a very poor smelting point, as far as profits were concerned, for some years, while the building of the Colorado Midland, and the completion of the through-road of the Denver & Rio Grande to Utah, gave the Leadville smelters a new chance of profit-making about 1890.

The plant of the former Consolidated Kansas City Smelting and Refining Company has recently been dismantled after a life of just about 20 years. In that time, however, it was practically rebuilt at least once, and that because it was absolutely necessary, in order to meet changed conditions. Yet, recalling the business ability and technical skill of the men who designed and managed it until very recently, no one would question the fact that no error was made either in the selection of the location or design of the plant when first constructed.

To me the 20-year period seems altogether too long an allowance for the life of a smelter. As to fixing any definite period, that seems to me impossible, as far as North America is concerned. The tendency toward centralized locations, large and completely appointed plants, involving heavy capital investments, conduces to a longer average life now than

has been the case for the past two decades. Still, I know of two recent ventures in Mexico—and they will not turn out monuments of misdirected enterprises either—where I doubt if the projectors have counted on even five years of profitable life for their establishments, so that they must have calculated on 20 per cent. or more per annum as amortization.

WM. R. BOGGS, JR.

Maroma, San Luis, Potosi, Mex.,
Nov. 19, 1906.

New Publications

"Revista del Servizio Minerario nel 1905." Pp. 478. 7½x10 in.; paper. Rome, 1906: Corpo Reale delle Miniere, Via S. Susanna, N. 9.

"Turning and Boring Tapers." By Fred H. Colvin, second edition. Pp. 32; illustrated. 5½x8 in.; paper, 25c. New York, 1906: The Derry-Collard Company.

"Architects' and Engineers' Hand-Book of Reinforced Concrete Constructions." By L. J. Mensch. Pp. 217; illustrated. 5x7½ in.; paper, $2. Chicago, 1906: Cement and Engineering News.

"The Production of Petroleum in 1905." By W. T. Griswold. Advance Chapter from Mineral Resources of the United States, Calendar Year 1905. Pp. 112. 5½ x9 in.; paper. Washington, 1906: Government Printing Office.

"The Geology of the Hokitika Sheet, North Westland Quadrangle, with which has been included a small portion of the Upper Wilberforce Valley, in the Waimakariri Quadrangle." By James M. Bell, assisted by Colin Fraser. New Zealand Geological Survey, Bulletin No. 1 (New Series). Pp. 101, 13 maps and sectional plans, and 42 plates. 8½x11 in.; paper. Wellington, New Zealand, 1906: John Mackay, Government Printer.

"Poor's Manual of the Railroads of the United States." Thirty-ninth Annual Number, 1906. Pp. 1808; 5½x8 in., cloth; with maps. New York; Poor's Railroad Manual Company. Price, $10.

A standard reference book like this cannot be reviewed. It has, in its 39 years of existence and growth, come to be known as indispensable for investors and for all concerned in the financial work of railroads. Each year, however, some improvements are to be noted, introduced as they are suggested by experience. In the present number the arrangement of the index pages has been improved, and the number of maps given has been increased. Additional matter, formerly published in a separate volume, has been included in this; this matter comes under three heads, data on bond issues, dividends for eight years, and dates of annual meetings, addresses of transfer agencies, etc. All this is of use to bankers and holders of securities.

In brief, it may be said that in a file of the "Manual" one has a complete and official record of the historical development, reorganizations, consolidations, financial operations and personnel of every line of railroad in the country from the inception of the system; and these facts are presented in such a comprehensive and understandable form as to present at a glance all the information any person may seek, arranged in conformity with a uniform standard.

"A Report on the Peat Deposits of Northern New Jersey." By C. W. Parmelee and W. E. McCourt. Being Part V of the Annual Report of the State Geologist. Pp. 92. 6x9 in., paper; with maps and illustrations. Trenton, N. J., 1906; State Printers.

Of the four chapters of this report the first and second are general, treating respectively of the origin, occurrence and and composition of peat, and of its technology and uses. The third relates to the testing and valuation of New Jersey peats, while the fourth gives the distribution of peat in the area covered by the report. There are a number of deposits of peat, of varying quality, in the northern part of New Jersey, but most of them are of small size. The more important are the Great Meadows along the Pequest river in Warren county; the Drowned Lands on the Upper Wallkill and the Pochuck meadows in Sussex; the Bog and Vly meadows and the Great Swamp along the upper Passaic in Morris county. The material is utilized in three plants, largely experimental. The American Peat Coal Company has a plant for making fuel briquets at Pequanac, while the American Agricultural Chemical Company and the Woodbridge Manufacturing Company are using peat from the Great Meadows in the manufacture of fertilizers. The peat resources of the State while moderate in extent will probably be fully utilized before long.

"The Copper Handbook; a Manual of the Copper Industry of the World." Volume VI, 1906. Compiled by Horace J. Stevens. Pp. 116; 5½x8 in. Houghton, Mich.; Horace J. Stevens. Price, cloth, $5; full morocco, $7.50.

This book begins with a chapter on the history of copper, followed by articles on the geology, chemistry, mineralogy, metallurgy, and uses of the metal, with eight chapters devoted to condensed descriptions of the known copper deposits of the globe. A glossary of mining terms will be found useful to many readers. The statistics of the copper trade and of copper share finances are covered in 40 pages of condensed tables. The major portion of the book is devoted to a chapter describing practically all known copper mines of the world, and listing every copper-mining company of importance. This chapter is arranged alphabetically, by titles, rendering it self-indexing. It gives the titles of 4626 mines and companies, there being 777 more titles than in the preceding annual edition. The descriptions range in length from two lines, in the case of unimportant old and idle properties to nearly 16 pages in the case of the Calumet & Hecla. The descriptions cover exact titles, full addresses, details of organization, officers and finance, in addition to particulars regarding location, area, ores, mine development, equipment and prospects.

The test of value of a reference book is found in the use of it. In previous volumes we have found that great care has evidently been exercised in this cimpilation. It is the only book of its kind in existence, and that it is fair and, in the main, correct, makes it valuable, especially at the present time when copper and copper stocks are so much in request.

"Report of the Commission Appointed to Investigate the Zinc Resources of British Columbia and the Conditions Affecting their Exploitation." Prepared for the Mines Branch of the Department of the Interior of Canada. Walter Renton Ingalls, Chief of Commission. Pp. 420; 7x10 in. With maps and illustrations. Ottawa, Canada; Public Printers.

The investigation of the zinc resources of British Columbia was undertaken by the Canadian Department of the Interior in response to petitions from the Silver Lead Association and the Associated Boards of Trade of the Province, and was placed under the general direction of Dr. Eugene Haanel, Dominion Superintendent of Mines. The Commission was composed of Walter Renton Ingalls, of New York; Philip Argall, of Denver, Colo., and Alfred C. Gardé, of Nelson, B. C. They were assisted by Dr. A. E. Barlow and Joseph Keele, of the Geological Survey of Canada, and others, including Henry E. Wood, of Denver, Colo. The work of the commission included an examination of the developed zinc mines of British Columbia, and to this was added later an examination of a number of undeveloped mines and of some reported occurrences of zinc ore in the Province. This field work, which was begun Sept. 1, 1905, necessarily occupied several months. The work was continued by experimental investigations on the treatment of the ores, which were completed in June, 1906.

The results of the commission's work are given in the present volume, which must be regarded as a full, in fact an exhaustive presentation of the subject. It includes six reports, or monographs, of varying length. The first, covering about one-third of the volume, is by W. R. Ingalls, and gives a general summary of the subjects. It is divided into four parts; the first, after an introductory and historical preface, treats in a general way of the character of British Columbia zinc ores; present and possible markets;

valuation of ores; cost of smelting; and wet processes of extraction. The second part is on the zinc mines of British Columbia, referring successively to their productive capacity, methods and cost of working; zinc smelting and the design of works; lead smelting and rates. The third part is a condensed account of methods used in the mechanical concentration of zinc ores, including sorting, magnetic separation, flotation processes and electrostatic separation; with a concluding section on electrothermic smelting. The fourth section is chiefly statistical, treating of production of zinc ores and metal; consumption of zinc and its prices in different countries.

The second report, by Philip Argall, is on the zinc mines of the East and West Kootenay districts, treating in detail the principal mines, the economic conditions and ore milling. The third, by Alfred C. Gardé, is on the mines of Ainsworth and the Slocan, following much the same lines as that on the Kootenay districts. The fourth report, by Dr. A. E. Barlow, relates to the undeveloped zinc deposits of Vancouver island, Texada island, the Nanaimo mining division, the Similkameen and other interior districts. A fifth report, by Philip Argall, discusses methods of concentration of British Columbia zinc ores, and gives the results of the ore tests made at Denver, Colo. The sixth and last report, by Henry Harris and Henry E. Wood, treats of the methods of assaying and chemical analysis.

An appendix gives a brief synopsis of the mining laws of British Columbia. The volume is provided with a full index to its contents. There are also many maps, of mines and geological sections, some of them in color, and a large number of diagrams, drawings of concentrating machinery, and reproductions of many photographs of mines, mills and plant.

The report is a careful presentation of the present condition of zinc mining in British Columbia; its prospects and future possibilities. It is of value, not only to the Canadian interests directly involved but to the zinc industry in general. F. H.

Patents Relating to Mining and Metallurgy

UNITED STATES

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which the notice of the patent appeared.

Published Week Ended Nov. 20, 1906

GOLD WASHER AND AMALGAMATOR—James J. Southwick, Great Falls, Mont., assignor of one-half to Max I. Goldstein, Great Falls, Mont. No. 836,148. Filed Oct. 19, 1905.

DUMPING CAGE FOR CRUSHERS AND PULVERIZERS—Milton F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Company, St Louis, Mo. Nos. 836,161; 836,162, 836,163. Filed July 24, 1905.

REFRACTORY MATERIAL AND METHOD OF MAKING THE SAME—Edward G. Acheson, Stamford township, Ontario, Canada, assignor to William Acheson Smith, Niagara Falls, N. Y. No. 836,354. Filed Sept. 23, 1905.

PRODUCTION OF GRAPHITE—Edward G. Acheson, Stamford township, Ontario, Canada. No. 836,355. Filed Sept. 22, 1906.

PROCESS OF TREATING ORES—Wilbur A. Hendryx, Los Angeles, Cal. No. 836,380. Filed Sept. 20, 1904.

DUMPING CAGE FOR CRUSHERS AND PULVERIZERS—Milton F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher and Pulverizer Company, St. Louis, Mo. No. 836,422. Filed July 24, 1905.

MINERS' CAP ATTACHMENT—William N. Brown, Lebanon, Ill., assignor of one-half to Frank Poignee, Lebanon, Ill. No. 836,481. Filed May 26, 1906.

PROCESS OF DETINNING TIN SCRAPS, ETC.—Karl Goldschmidt and Josef Weber, Essen-on-the-Ruhr, Germany, assignor to the firm of Th. Goldschmidt, Essen-on-the-Ruhr, Germany. No. 836,496. Filed June 29, 1905.

PROCESS OF IMPROVING THE MAGNETIC QUALITIES OF IRON-SILICON-ALUMINIUM ALLOYS—Robert A. Hadfield, Sheffield, England. No. 836,497. Filed Aug. 21, 1906.

MANUFACTURE OF STEEL FROM ORDINARY IRON—Adam Massott, Jr., Mutterstadt, Germany, assignor to Fritz André, Haardt, near Neustadt A/H., Germany. No. 836,520. Filed Jan. 23, 1906.

SMELTING FURNACE — William J. Watson, Ladysmith, British Columbia, Canada. No. 836,548. Filed Aug. 6, 1906.

ORE SEPARATOR—Adam J. Bauer, Collinsville, Ind., Ter. No. 836,553. Filed Dec. 7, 1905.

STEEL ALLOY—Albert de Dion and Georges Bouton, Puteaux, France. No. 836,567. Filed Aug. 15, 1904.

SMELTING OF SULPHIDE ORES—Rokusaburo Kondo, Tokio, Japan. No. 836,586. Filed March 2, 1906.

WET METHOD OF EXTRACTING COPPER, ZINC, ETC., FROM THEIR ORES—Denis Lance, Paris, France. No. 836,587. Filed Aug. 7, 1905.

ROASTER—Everett T. Shortt, St. Louis, Mo. No. 836,610. Filed March 27, 1906.

Published Week Ended Nov. 27, 1906.

PROCESS OF IMPROVING THE MAGNETIC QUALITIES OF IRON-SILICON AND SIMILAR ALLOYS — Robert A. Hadfield, Sheffield, England. Nos. 836,754, 836,755, 836,757, and 836,762. Filed Feb. 27, July 5, July 5 and Aug. 21, 1906.

MAGNETIC ALLOY — Robert A. Hadfield, Sheffield, England. Nos. 836,756 and 836,758. Both filed July 5, 1906.

METHOD OF MAKING MAGNETIC MATERIALS—Robert A. Hadfield, Sheffield, England. Nos. 836,759, 836,760 and 836,761. All filed July 5, 1906.

BLAST FURNACE—John Coyne, Wilkinsburg, Pa. No. 836,801. Filed Dec. 22, 1904.

ROCK-DRILL BIT—John B. Pace, New York, N. Y. No. 836,824. Filed Nov. 21, 1905.

METAL SHEET PILING — Ralph V. Sage, Westmont, Pa. No. 836,832. Filed Sept. 27, 1905.

METALLIC SHEET PILING—Ralph V. Sage, Westmont, Pa. No. 836,833. Filed Sept. 27, 1905.

ROCK DRILL—William C. Whitcomb, Chicago, Ill. No. 836,846. Filed Nov. 2, 1905.

MECHANICALLY RABBLED ORE-ROASTING FURNACE—Thomas Edwards, Sebastopol, Ballarat, Victoria, Australia. No. 836,871. Filed Jan. 27, 1905.

MINE-CAR STOP—John Hamilton, Byesville, Ohio. No. 836,880. Filed March 2, 1906.

PROCESS OF BRIQUETTING—Robt. Schorr, San Francisco, Cal. No. 836,897. Filed Dec. 5, 1905.

MAST FOR WELL-DRILLING MACHINES—Mert McCain, Portland, Ind. No. 836,985. Filed April 5, 1906.

INTERLOCKING METAL SHEET PILING—George E. Nye, Chicago, Ill., assignor of one-half to Gustavus A. Kreis, Chicago, Ill. No. 836,987. Filed May 25, 1906.

AERIAL TRAMWAY—George G. Schroeder, Washington, D. C., assignor to Industrial Motor Company. No. 836,995. Filed June 25, 1906.

ROCK DRILL—Joseph J. Rekar, San Francisco, Cal. No. 837,118. Filed April 13, 1906.

PRODUCTION OF FUSED METALS AND ALLOYS FROM OXIDES, ETC.—Claude Vautin, London, England. No. 837,160. Filed Aug. 23, 1905.

HOISTING MACHINE—Jeremiah Campbell, Providence, R. I. No. 837,190. Filed Jan. 14, 1905.

FURNACE—William F. Carr and John P. McLimans, Coatesville, Pa. No. 837,191. Filed Oct. 26, 1905.

GREAT BRITAIN

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Published Week Ended Nov. 17, 1906.

ALUMINO-THERMIC PROCESS—K. A. Kuhne, Dresden, Germany. Improvements in the alumino-thermic process for reducing metals from their oxides, consisting in the addition of chlorate of potash to the mixture of aluminum and oxide. No. 20,884 of 1905.

REDUCTION PROCESS—H. T. Simpson, Bilbao, and A. E. Bourcaud, Gijon, Spain. An improved process for reducing iron from its ores by using a gaseous reducer produced from lignite or other poor coal found locally. No. 21,060 of 1905.

PREVENTION OF BLOW-HOLES — R. A. Hadfield, Sheffield. Improved method of preventing the formation of blow-holes in high-class steel castings. No. 21,451 of 1905.

FLOTATION PROCESS—H. L. Sulman, H. F. K. Picard and J. Ballot, London. Improvements in the inventors' flotation process for separatng certain metallic compounds from gangue, with the object of more equally wetting the various constituents of the ore. No. 26,711 of 1905.

BALL MILL—H. Lohnert, Bromberg, Prussia. In ball mills, an improved fastening for the protection plates. No. 331 of 1906.

MINE CAGE DEVICE—W. Youdan and J. Tinsley, Barnsley. Improved gripping devices for sustaining mine cages when the hauling rope breaks. No. 3945 of 1906.

CASE-HARDENING PROCESS — F. Grunewald, Berlin, Germany. An improved method of case-hardening iron or steel by means of an atmosphere of hydrocarbon gas. No. 12,130 of 1905.

COAL-DUST CATCHER—G. A. Mower and W. J. Bassett, London. The application of fans for the purpose of catching coal dust escaping from coal tipples at the pit's mouth. No. 17,017 of 1906.

Published Week Ended Nov. 10, 1906.

SMELTING PROCESS—F. Mackay and A. J. Beckwith, Melbourne, Australia. A process for smelting zinc-lead and other sulphides by injecting the ore in a state of very fine powder, together with a current of air, into a hot chamber, and methods of treating the oxides and sulphates so formed. No. 20,380 of 1905.

MINERS' LAMP—W. Best, Morley, Yorkshire. Improvements in safety lamps for miners, with the object of throwing the light below the lamp as well as at the sides. No. 21,729 of 1905.

METHOD OF GOLD EXTRACTION—J. Turton, Johannesburg, S. A. In the extraction of gold from ores treating them with a solution containing sulphuric acid, salt, saltpetre, permanganate of potash and saccharine, and subsequently precipitating the gold by means of charcoal. No. 25,672 of 1905.

ALUMINOTHERMIC PROCESS — H. Goldschmidt, Essen, Germany. Improvements in the inventor's aluminothermic process for producing heat and reducing iron and other metals by the reaction of aluminum on iron and other oxides by the addition of calcium to the aluminum. No. 926 of 1906.

REDUCTION PROCESS—E. Maemecke, Berlin, Germany. In the Goldschmidt aluminothermic process for the reduction of metals from their oxides, the substitution of a compound of silicon and magnesium as the reducing agent instead of aluminum. No. 3089 of 1906.

LEAD REDUCTION—C. P. Townsend, Washington, U. S. A. Reducing lead from galena, electrolytically, in a bath of fused chloride of alkali or alkaline earth. No. 6569 of 1906.

COAL-BORING MACHINE — Ernest Haeckel Company, Saarbrucken, Germany. In coal-boring machines, using a large boring tool which discharges the bored material through its hollow central space. No. 7510 of 1906.

Personal

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Theo. Dwight, of New York, is in Mexico City.

Geo. L. Fisher, of El Paso, Texas, is in Mexico making examinations.

Hudson H. Nicholson has gone to Nevada, on professional business.

R. Meeks, of the ENGINEERING AND MINING JOURNAL staff, is visiting the Cobalt district in Ontario.

John Hays Hammond arrrived at Cobalt, Ont., Nov. 27, and was expected to remain for about a week.

W. A. Burke, of Cardinal, Boulder county, Colo., is making a visit to the East on business matters.

W. S. Barrick, of the Apex Company, at Apex, Colo., has gone to Nevada to look after mining inerests.

James W. Neill, of Pasadena, Cal., consulting engineer for the East Butte Company, is in Butte, Montana.

C. W. Purington, who has been engaged in mine examinations in northeastern Utah, has returned to Denver.

Louis Webb, of Cambridge, Mass., and F. B. Reese, of California, are assisting H. H. Webb in examinations in Mexico.

G. A. Denny and H. S. Denny, of London, have been spending the last week in New York. They intend to visit the West.

Dr. F. P. Van Denbergh, of Denver, Colo., has gone to Cumpas, Sonora, Mexico, as chief chemist to the Belen copper mines.

Percy F. Martin, of England, is visiting the various mining camps of Mexico preparatory to an extended article on the Republic.

George W. Mabee, Sr., of Denver, has returned to Central City, Colo., after several weeks spent in the East on business matters.

C. B. Lewis, president of the National Metal Company, of New York and Mexico, has returned to New York after some weeks in Mexico.

W. E. Campbell, of the Fostoria Company, operating near Idaho Springs, Colo., has been making a visit on mining business to Toledo Ohio.

John J. Reilly, a Denver mining engineer, who has been in Cobalt, Ont., for several months, is making a visit to Gilpin county, Colorado.

W. H. Knowles, of Denver, who is largely interested in Gilpin and Clear Creek counties, Colo., is making a business visit to the East.

W. C. Greene, of the Greene Consolidated Copper Company, Cananea, Sonora, has returned from a tour through central Mexico with a large party of friends.

C. B. Frantz, of the Jenny Creek Company, operating in the northern section of Gilpin county, has returned from an extended visit to Pennsylvania.

E. J. Adams, a mining operator of the Pine Creek district in Gilpin county, Colo., is making a business visit to Omaha, Neb., and other eastern points.

H. Kane, manager for the J. Hearne mining interests in Gilpin county, Colo., has returned to Central City after a business visit of several weeks to the East.

Theodore Becker, of New York, has been spending several days in Gilpin county, Colo., looking after mining interests near Central City and Black Hawk.

A. V. Clubbs, J. J. Hooton, and J. C. Green, of Pensacola, Florida, have been looking over the tungsten interests on North Beaver creek, near Rollinsville, Colorado.

William Ballantyne, formerly an operator in Gilpin and Clear Creek counties, Colorado, has gone to Manhattan, Nev., to take charge of mining property for Denver people.

Dr. William B. Phillips, of Birmingham, Ala., is leaving there next week for the lead-zinc regions of northwest Arkansas, and will afterward visit Texas to examine a coal property.

Victor Rakowsky, consulting engineer for the Butte & Superior Copper Company, with headquarters in Duluth, Minn., spent a few days in Butte recently on company business.

C. Colcock Jones, after an absence of two months in Utah and Idaho, returned to Los Angeles, Cal., recently, but left a few days later for southwestern Arizona, on professional business.

J. O. Foose, chief engineer at the Brown-Bonnell and Bessemer works of the Republic Iron and Steel Company, has resigned and has been succeeded by Arthur L. Strickland.

Nicholas Treloar, manager of the Yampa smelter in Utah, and also the Britannia Mines Company's property, near Vancouver, B. C., was in Butte recently on his way from the North to Utah.

H. W. Otto and H. P. Otto, of Pittsburg, Penn., and D. M. Seron and J. Trotter, of Kansas City, Mo., have been looking over interests in the Alton mine at Cardinal, Boulder county, Colorado.

Norman W. Parlee, who has been engineer for the Wabana iron mines, at Conception Bay, Bell Island, Newfoundland, has gone to California to enter upon his duties as manager for the Columbus Borax Company, at Lebec, Kern county.

Vincent H. Martyn, until recently advertising manager of the *Mining Magagine,* is now associated with the ENGINEERING AND MINING JOURNAL. He is in charge of its business interests in Denver, San Francisco and the intervening territory.

M. L. Requa, of San Francisco, Cal., has resigned as vice-president and general manager of the Nevada Consolidated, at Ely, Nev. Pope Yeatman, of New York, has been placed in charge of the operations of both the Nevada Consolidated and the Cumberland-Ely, with the title of "director in charge of mines." He has also been elected to the board of directors of both companies.

Obituary

Henry Wehrum, formerly general manager of the Lackawanna Steel Company, died at Buffalo, N. Y., Nov. 23, having suffered a stroke of apoplexy on Sunday, Nov. 18. Since his resignation from the Lackawanna Steel Company in 1903 he had lived a retired life. He was born in 1843 in Alsace-Lorraine, and early assumed responsibilities. At 16 he started at the bottom of the ladder in one of the largest iron works in Alsace. Natural aptitude and the closest application brought advancement, and he was soon recognized for marked ability in mechanical and metallurgical lines. He was an earnest advocate of the then new bessemer steel process, which he closely watched through all its development. Shortly after the Franco-Prussian war he came to the United States, accepting a position with the old Lackawanna Iron and Coal Company, at Scranton, Penn. His merit soon won recognition, and he rose steadily, becoming chief engineer of the company, which position he held for some years. In 1881 he resigned to construct the new works of the Scranton Steel Company as chief engineer. When the Scranton Steel Company consolidated with the Lackawanna Iron and Coal Company forming the Lackawanna Iron and Steel Company he was made chief engineer and general superintendent of the new company. He was appointed general manager in 1896. In all these years of active work he personally superintended all the various undertakings of this company. Besides being general manager of the large plant at Buffalo, he was director and general manager of the subsidiary companies of the Lackawanna Steel Company. The work undertaken at Buffalo in 1900 involved the most extensive program of iron and steel works construction ever undertaken up to that time at a single point, and some noteworthy departures from common practice were made. Under Mr. Wehrum's administration at Scranton the manufacture of rails by the Scranton Steel Company and later by the Lackawanna Iron and Steel Company was developed in a way that attracted attention widely. Mr. Wehrum's mathematical abilities had free play in the field of roll design, in which he was particularly successful. To the chemistry of steel-rail manufacture he also brought his

unusual metallurgical training, securing some results, both in strength and wearing qualities, with the Scranton rail made from Cornwall ores, that were quite outside the calculation of the books. Mr. Wehrum is survived by his widow, three daughters and a son.

Societies and Technical Schools

Coal Mining Institute of America—The winter meeting of this society will be held in the Court House at Pittsburg, Penn., Des. 18-20. Besides the annual address by President Fred C. Keighley, papers will be read by Dr. J. A. Holmes, H. S. Gay, of Logan, W. Va., H. H. Stoek and others.

University of Washington—At this institution at Seattle the ninth annual session of the "Special Course for Mining Men" will begin Jan. 3 and continue until April 3. This course is intended chiefly for men who wish to supplement their practical experience by theoretical knowledge, and the instruction is free. The subjects include chemistry, assaying, mineralogy, geology, mining and milling methods, metallurgical practice and mine surveying. Full details can be obtained from the registrar of the University, at Seattle.

Industrial

The Arthur Koppel Company has removed its offices in Pittsburg, Penn., to Machesney building on Fourth avenue.

The John A. Traylor Machinery Company has removed its offices in Denver, Colo., to 439 Seventeenth, corner of Glenarm street.

Owing to increasing business in the city and vicinity of Baltimore, the H. W. Johns-Manville Company, has opened a branch office at No. 315 Equitable building, Baltimore. This office will be in charge of W. F. Baird, previously connected with the Philadelphia branch.

The Negociacion Minera Santa Maria de la Paz y Anexas, of Matehuala, have ordered of G. & O. Braniff & Co., who are agents for Mexico of the Westinghouse Electric and Manufacturing Company, and the Westinghouse Machine Company, both of Pittsburg, a steam-driven electric plant to be installed at the mines. The electric power will be used to drive a multi-stage Byron-Jackson centrifugal pump built by the Byron Jackson Machine Works of San Francisco, for which company Braniff & Co. are also agents. This pump will deliver 150 gal. water per minute against a total static head of 1640 ft. This is the greatest head against which a single centrifugal has ever been operated in Mexico. This pump is driven by and direct coupled to a Westinghouse 150-h.p. alternating-current motor making 1700 revolutions. The generating plant consists of a Westinghouse compound 16 & 27x16 steam engine which drives a 140-kw. three-phase, 440-volt, 7200-alternation generator.

Trade Catalogs

Receipt is acknowledged of the following catalogs and circulars:

Jeffrey Manufacturing Company, Columbus, Ohio. Jeffrey Pulverizers, catalog No. 31, illustrated; pp. 70, paper, 6x9 in. 1906.

Allis-Chalmers Company, Milwaukee, Wis. Bulletin 1417, August, 1906. Smelting Furnaces and Accessory Equipment, illustrated; pp. 48, paper 8x10½ inches.

Ingersoll-Rand Company, New York. Pneumatic Tool Department. Bulletin No. 2008. "Imperial" Motor Hoists and Stationary Motors; illustrated, pp. 32, paper, 6x9 in. 1906.

The Cutler-Hammer Manufacturing Company, Milwaukee, Wis. Bulletins Nos. 34 to 79½. Miscellaneous Electric Machinery; pp. 2 each; illustrated; paper, 5x8 in., May, 1906; Nov., 1906.

Construction News

Epes, Alabama—The Winona Portland Cement Company is preparing to build cement works and will need machinery. Houston Armstrong, Selma, Ala., is treasurer.

Ely, Nevada—The McDonald-Ely Copper Company, recently organized, is opening a property and will need mining machinery; later, concentrating and mill machinery. David Keith, Salt Lake City, Utah, is concerned.

Yerington, Nevada—The Nevada Douglas Copper Company is preparing to purchase hoists and other machinery, also traction engines to haul its ore. Walter C. Orem, Salt Lake City, Utah, is manager of the company.

Spring Place, Georgia—The Alyce Mineral Company has acquired 2100 acres of land, and proposes to open a mine and to erect hoists, etc.; later, milling machinery and a smelter. J. G. Sterchie, of Knoxville, Tenn., is president of the company.

Texas—Indian Territory—The J. M. Guffey Petroleum Company and the Gulf Refining Company have combined to build a pipe line about 430 miles long from a central point in the oilfields of the Indian Territory to the Gulf shore in Texas. Besides the steel pipe, pumping engines and other machinery and steel storage tanks will be needed. The tanks will be built at both the shipping and receiving points. C. H. Markham, general manager of the Guffey Company, at Beaumont, Texas, has charge at present. Some contracts have already been let.

Special Correspondence

San Francisco Nov. 29

Arrangements have been made by which Captain W. A. Nevills is again in active charge of the Rawhide and App mines in Tuolumne county, which have been for some times in the hands of a receiver. A paper has been placed on record which is virtually a mortgage for $100,000 from Captain Nevills to the Central Loan and Trust Company, of Fresno. By the terms of this instrument the App and Rawhide mines, as well as the properties owned by Captain Nevills in Amador county, are pledged to the Central Loan and Trust Company for the payment of $100,000. This money has been advanced for the express purpose of paying off the creditors for whom Geo. W. Ade has acted as trustee.

The decision rendered by the Superior Court of this city in the case of George E. Riley and others vs. the North Star Mining Company has been reversed in the Supreme Court. The suit was instituted against the mining company to recover the value of ore alleged to have been wrongfully appropriated by the North Star Mining Company from the mine of Riley. A nonsuit was granted and judgment rendered in favor of Riley. On appeal to the Supreme Court the decision was reversed on the ground that the lower court erred in sustaining objections to evidence offered by Riley and others to show the value of the rock taken from the lode. The property involved is known as the Massachusetts Hill mine, Grass valley, Nevada county. The North Star Mining Company, whose properties are located adjacent to the Massachusetts Hill mine, followed the vein under surface and took rock from the Riley property.

The minority dissatisfied stockholders of the North Bloomfield Mining Company, of Nevada county, object to the action of those who control the corporation and held a meeting in this city this week to protest. At one time this was the largest hydraulic mine in the world and it became the object of the famous suit before Judge Sawyer, the decision of which virtually killed the hydraulic-mining industry in certain portions of the State. The mine was closed for a long time, and then they began to drift it. During the idleness the extensive water rights became of great value. At the meeting the minority stockholders stated that they could not get any satisfaction as to the company's financial standing, or what has become of the land holdings and water rights.

The Bay Counties Power Company expects to commence work in a short time on an electric power line from the Rome power-house to the Alaska mine, Sierra county, a distance of something over 10 miles on an air line. The pole line will cross the hills close to the town of Cherokee.

A survey is being made by the Southern Pacific Company between Lincoln and Van Trent, Placer county, in order to ascertain the comparative cost of a railroad from Lincoln to the Dairy Farm mine.

Bisbee, Arizona Nov. 30

It is quite probable that the present Mexican mining laws, which were amended only a year or two ago, will be further amended, and made more simple, very soon. The cost of land denouncements, which is now about $1 gold, per acre, is to be reduced, and there will be exemptions in taxes and import duties, and concessions to heavy mining investors. The object is to advance further the investment of American capital in mining in the Republic. In addition to these inducements, the present manner of perfecting mining titles is to be shortened and simplified materially.

There is much talk of the erection of a second smelter at Globe, and the Mitchell Mining Company, which has been an investor in undeveloped claims there for the past few weeks, is said to be back of the project. A year ago a project of this sort was under way for Globe, but it fell through, and it is unlikely that any party has again taken it up in earnest. The Mitchell company is not in position to do so at present. Globe presents attractions for a new copper-reduction works, as it is becoming the center of a considerable district, reaching from the San Carlos reservation to the Kelvin region, and the plan of the Southern Pacific road for building into Arizona from the Durango coalfields north, via Globe, which will be the first copper center reached, has its advantages. This road is to be built very soon, and will be a most important factor in the development of the smelting industry of the territory.

At the Douglas works of the Copper Queen and the Calumet & Arizona, extensions to present plants are being made. The Queen has its tenth furnace nearly ready for use, and will blow it in soon after the holidays. It will treat about 400 tons of charge per day. Calumet & Arizona has blown in its fourth furnace, and is preparing to open its fifth, which will place all its furnaces in blast. The former idea of maintaining one as a "spare" is not regarded favorably by the new management. This company will average at least five 300-ton furnaces all through 1907, and the works of the two companies will smelt 5600 tons per day all the coming year. This would make about 200,000 lb. copper for the year, and if there is no unexpected difficulty, the product of the Warren district will approximate at least 185,000,000 lb, while it may easily reach the 200,000,000-lb. mark.

No decision has been reached by the directors of Shattuck as to smelting works, except to announce that they will build in time. They have just taken a property in the Tordillos, a short distance south of here, and are waiting the development of this and their Denn mine before assuming the responsibilities of smelting works. Shattuck mine is developing well, and will be a producer of about 16,000,000 lb. of red metal in 1907. This will be a part of the product of the Copper Queen reduction works. It is possible that a portion of the ore coming out of the new Cananea Central will be smelted at Douglas. The Copper Queen is now receiving a very large amount of custom ores from all parts of southern Arizona, southern New Mexico, and from many districts in Sonora. The sampling plant is busy, and this feature of the company's business has more than met the expectations of the management. It has proved a great accommodation to the surrounding regions, and is assisting greatly in their development.

The Warren Company has filed articles here, capital stock $665,000, and L. W. Powell, who has charge of the Calumet & Arizona interests in this section, it at its head. The company is intended to finance the various public utilities for the new mine town of Warren, which adjoins Bisbee. It will build sewers, electric street lines, light and water works, gas plants, etc., for the new town.

Salt Lake City Nov. 3

The Consolidated Mercur Company has delared the last quarterly dividend of the year, which is payable on Dec. 19. The directors of the company have authorized the installation of some new slimes equipment to the mill, which is the result of a long series of tests conducted by Manager George H. Dern and the company's metallurgist, W. T. Janney, who claim to have worked out a new process which will effect a saving of about 50c. per ton more of the values than is possible under present methods.

Two new companies have been launched here to operate in the camp of Ely, Nevada. The McDonald Ely is one of them, with David Keith, president; Col. E. A. Wall, vice-president; Frank Knox, treasurer, who, with Thomas Kearns, Frank J. Westcott, G. W. Lamb, G. W. Parks, of Salt Lake, and D. C. McDonald, of Ely, are directors. The company owns several large groups of claims and valuable water rights. The Federal Ely is officered by A. C. Ellis, Jr., W. J. Craig, vice-president; L. H. Farnsworth, treasurer; R. J. Evans, secretary; and W. M. Bradley and John T. Hodson, all of Salt Lake, directors.

Samuel Newhouse has secured with associates, an option on the Dyer group of copper claims near Yerington, Nev., and will form the Western Nevada Copper Company in the near future.

The Commonwealth Mines Company has been formed under Wyoming laws to develop and operate a group of claims in the Star district, Beaver county, Utah. Newton Dunyon is president; W. M. Bradley, vice-president; W. T. Atkin, secretary and treasurer; who, with C. H. Strevell and James H. Patterson, of Salt Lake, are directors.

The shareholders of the Lower Mammoth Mining Company, operating in the Tintic, Utah, district, have authorized the issue of $40,000 worth of bonds bearing 8 per cent. interest per annum and convertible into new stock at the rate of $1 a share if taken within one year. When this stock is issued the capitalization of the company will be 190,000 shares.

The Newhouse Mines and Smelters Corporation, operating the Cactus mine and mill in Beaver county, is marketing 100 tons of concentrate daily. The product sells for about $60 a ton. The copper contents bring about $50 a ton.

The Emma Copper Company has been formed to operate the old Emma mine at Alta, which produced heavily in the early days of that camp. John A. Kirby is president; Joseph L. Lippman, vice-president; E. C. Howard, secretary and treasurer, and William M. Wantland, manager. All of Salt Lake.

There are no new developments in the Salt Lake valley smelter, smoke situation, nor is there likely to be for some time, as the case will be carried on up to a higher court. In the meantime the restraining order will be ineffective and the smelters will continue as usual.

Denver Dec. 1

Favorable reports come from Silverton and other points in San Juan county. Shipments of smelting ore and concentrates have been unusually large this season, and the grade is well maintained.

Several strikes of good ore are reported from Spaulding, where a number of claims have been worked through the season.

In the upper section of Clear Creek county there is, apparently, unusual activity. In the month of November the shipments of smelting ore from that section were the largest ever made for a similar period.

The investigation of the alleged frauds in locating coal lands in Colorado and Utah continues to attract a great deal of attention. The latest sensation is the charge that political influence has been brought to bear in high quarters to stop the investigation. The hearing will be resumed next week, when a lot of testimony as to freight rates will be put in. The investigation will probably continue for some time.

Indianapolis Dec. 3

The official call for the eighteenth annual convention of the United Mine Workers of America, which will be held in this city beginning Jan. 15, has just been issued from the headquarters of the miners. More than 1000 miners will attend the convention. Though the coal operators will hold no meetings here this

year it is expected that many operators will be present to watch the proceedings of the miners. As far as known, no business, other than of routine nature, will be transacted, and it is thought the work of the convention can be completed within a week. The contract signed a year ago will hold until April 1, 1908.

The two days' rain of the past week brought gladness to the coal-mine operators since it filled up the ponds and reservoirs from which water is obtained for the boilers. A few mines had shut down and others were supplied with water hauled for miles.

There is a peculiar mine strike at the Bennett mine near Terre Haute. The operator would not permit a mine committee to inspect the scales and discharged the committee. Then all the miners were called out and they found work at other mines. The operator at the Bennett mine is not a member of the Operators' Association and is left alone with an idle mine and no one to assist him in his controversy with the United Mine Workers.

The Indiana miners of the bituminous field, which includes all the mines in the State except the block-coal mines in Clay county, are to vote for their officers by popular ballot through the referendum instead of the delegate convention, as heretofore. The balloting must be concluded by the second week in December. The nominations are all in. The district convention will meet next March.

Fuel conditions in many of the manufacturing centers of this State are bad. With the present small supply sudden and prolonged cold weather would bring about a serious famine. There are two causes for this. The railroad companies are short of cars and when carload lots are delivered to dealers or consumers they leave it on the cars prefering to pay $1 per day demurrage rather than to handle the coal twice.

It is said about the first thing the Legislature will do in January will be to increase the power of the Railroad Commission to deal with railroads in the matter of hauling coal from the mines. It is said the railroad companies have no difficulty in hauling immense quantities of coal from Eastern mines into Indiana, but plead insufficient supply of cars, engines, etc., to haul Indiana coal to market.

Scranton Dec. 3

An independent coal company has been organized by Thomas A. Dunn, of Wilkes-Barre, and will operate a colliery to be built in West Side, Wilkes-Barre.

Pea coal is to be classed as a domestic size; the mesh through which it is now passed will be increased about ¼ in. The price will be raised 25c. a ton. In line with this statement the Philadelphia Coal Exchange announces that the price of pea coal to retailers is increased from $4.50 to $4.75 a ton, effective on Dec. 1.

The Dodge Coal Storage Company, of Philadelphia, is now building a very large coal-storage plant, having been awarded a contract by the Atlas Cement Company to erect a plant in Northampton, Pa., with a capacity of 100,000 tons. In the center of the field, constructed entirely of concrete, is an enormous coal bin, into which the cars of fuel are to be emptied. Directly over this, and using the walls for its foundation, is one end of a trestle, 300 ft. long over all, which swings around on a turntable in a complete circle. The other end of the trestle rests on two iron frames, which in turn rest on a pair of electrically controlled trucks, by means of which the trestle can be swung into any position desired by the operator in the engine room at the other end of the trestle. This gives a circular coal-storage surface with a diameter of 560 ft., which can be covered to 30 ft. depth with coal.

Toronto, Ont. Nov. 21

The Canadian Refining Company, recently organized at Ottawa with $2,000,000 capital, will supply the Dominion mint with gold and silver for coinage purposes. The company is looking for a suitable site in Hull, Quebec.

William Robinson has located a discovery of iron ore in Snowden township, Haliburton county, Ontario. The orebody is 150 ft. wide and is the largest in the district, where there are several mines in operation. The Provincial Bureau of Mines has also received a report of an important discovery of iron ore in Homer township, on the north shore of Lake Superior.

Gordon Cobalt—Forty acres of the property belonging to this company have been sold to Willis Abbott, of New York, for $320,000. No ore has as yet been shipped from this mine as it only assays from 70 to 120 oz. per ton, which is below the grade at which it is considered profitable to ship a long distance for smelting. The company retains 40 acres.

London Nov. 24

This week investors have been invited to subscribe to another Cornish tin proposition, the Commerce mine in the St. Austell district, which is being floated as the Wheal Commerce Tin Mine, Ltd. The mine has been floated before, for in 1900 it appeared as the Commerce Tin Mine, Ltd. That venture, however, did not pay and a year ago the debenture holders foreclosed. The present flotation is in different hands, and as the promoters appear to be in command of greater financial resources than the previous managers, there is more probability of success being attained. There is no doubt that there is plenty of tin ore running from 30 to 50 lb. of black tin per ton, and that the black tin fetches a good price, owing to its purity. Twenty stamps of 1050 lb. each are being erected, in addition to the 14 old stamps of Cornish type. The new dressing plant will insure a more complete recovery than formerly. It is intended to treat 50 tons a day.

The first general report on Le Roi mine since the control was captured a year ago by A. J. McMillan has been issued this week. It covers the year ended June 30, 1906, so that only half of it deals with Mr. McMillan's régime. It shows, however, that considerable advantage has been derived from adopting a fixed policy. During the five previous years the mine was the sport of contending factions, and rival smelters and railway companies were vying with each other for its capture. The consolidation policy advocated a year ago might have been more advantageous than the present isolation, and the professional men connected with the properties with which it was proposed to amalgamate may have been more brilliant mining engineers and metallurgists than Mr. McMillan. That is not the point. The advantage of Mr. McMillan's policy has been to stop this internecine strife and the continual choppings and changings. Anyhow Le Roi can now pay dividends, having made a profit of £37,000 during the year, after having paid nothing for five years. The contract with the Trail smelter has been modified, and instead of all the output going there, some of it now goes to the Northport, which it had been practically decided to dismantle. During the year 110,042 tons of ore were mined and shipped to Northport and Trail, the average value being $12.37 per ton. It is not necessary to go into details here.

The Anglo-Silician Sulphur Company has issued its tenth annual report, for the year ended July 31 last, and though naturally it does not contain any information on the position of the Silician sulphur industry which is not already known, it gives an outline of the financial position of the company which is of interest. During the year in question the net divisible profit was £30,906 which was not sufficient to pay the 6 per cent. dividend on the 700,000 preference shares, so the amount had to be made up by the transfer of the necessary amount from the capital guarantee fund. The whole of the company's stock of sulphur has been sold to the Consorzio Obbligatorio at a price which involves a loss to the company of £298,105. To meet this loss £175,467 has been transferred from the depreciation reserve fund, which is thus wiped out, and the remainder from the general reserve fund, which will then stand at only £26,515. The company has only just received the provisional bond certificates of the Consorzio, which will be exchanged later on for the definitive bonds. How to deal with these bonds will have to be considered later on, but at present the directors desire to dispose of them in some way, distribute the assets, and dissolve the company.

General Mining News

ARIZONA

YAVAPAI COUNTY

Climax Gold Mining Company—The manager of this company, ex-Gov. Geo. Wolfley, brought in from the mines of this company a bar of gold valued at $2000, the result of a mill run on 42 tons of ore. The property lies 10 miles south of Prescott and is at present worked by lessees, all of whom are taking out high-grade ore.

Nickel Ore—Edward Haney reports that he has made a discovery of this ore near Ramsgate, but up to the present time he has not done sufficient work to prove the extent of the find.

Wickenburg District—W. P. Belding, of Denver, has been looking over this district in the interest of Eastern investors and reports favorably.

CALIFORNIA

AMADOR COUNTY

Wildman—Bishop & Spring, who acquired title to this property at Sutter Creek through foreclosure of a mortgage some months ago, have transferred it to W. J. Murphy.

Bellwether—The owner of this mine at Jackson, S. W. Bright, has sold it for $50,000 to the Guggenheims, who, it is understood, will sink a 1000-ft. vertical shaft. F. C. Hammond is to be superintendent.

FRESNO COUNTY

Copper—From the Copper King mine at Clovis 100 tons of copper ore are being shipped to the Tacoma (Wash.) smelter daily. Work has been commenced on a new copper mine three miles west of the Copper King.

INYO COUNTY

Death Valley Wonder Milling and Mining Company—This Los Angeles company is about to develop mines in the Panamint range, Wild Rose district, under superintendence of J. P. Branley.

Southern Bell Mining Company—On this property Superintendent Vandercook has completed the installation of electric hoists, compressor, etc., and a level is being opened at 325 ft. depth.

MARIPOSA COUNTY

Mount Gaines Consolidated Mining Company—A Los Angeles company is now developing some of the 11 claims owned by it, including the Mount Gaines mine, six miles from Hornitas, at one time a good producer, but abandoned some years ago as "worked out" by its owner, George Crocker, of San Francisco. The company unwatered the mine and is now installing a 20-stamp mill. Fred C. Longe is superintendent.

MADERA COUNTY

Golden State Mining Company—This company has been organized to work newly discovered claims near Raymond, and Superintendent R. D. Morris has set a number of miners at development work.

MONO COUNTY

Mill—Shaw & Brougher are about to build a 10-stamp mill in Masonic district and have graded so that 40 stamps may be put up if found desirable.

NEVADA COUNTY

Ironclad—At this mine, Rough-and-Ready district, which has been recently pumped out after lying idle a year, hoisting of ore to the mill has commenced. The upper levels have all been cleaned out. H. M. Black is superintendent.

SAN DIEGO COUNTY

Picacho Basin Mining Company—To work mines near the Colorado river this company has been organized, with the following directors: J. E. Ridgway, R. F. Pettigrew, J. N. Vance, John I. Bishop, J. C. Lutz and C. S. Middleton.

SHASTA COUNTY

Stonewall Group—This group of mines near the Balaklala, northwest of Copley, has been sold by Mrs. Rose to Albert F. Ross. The mines are of copper and the price is reported as $132,000.

SISKIYOU COUNTY

McKinley—The shafts and drifts having been pumped out at this mine, work has been resumed and ore is being taken out under superintendence of A. L. Hayes.

TRINITY COUNTY

Big Creek—At this gravel mine, Hay Fork, J. P. Dobbyn, superintendent, a rubble elevator is to be put at work.

TUOLUMNE COUNTY

Clio—It is reported that a 200-stamp mill is contemplated for this mine near Jacksonville, where large orebodies are in evidence.

Patterson—At this mine, Tuttletown, owned by the Pyrennees Mining Company, the grading for the 20-stamp mill has been completed.

YUBA COUNTY

Camptonville—In this old district there is more activity at present than has been the case in years. The American Flag mine is being thoroughly developed, as is the Pleasant View.

COLORADO

BOULDER COUNTY

United Oil Company—This company has purchased for $40,000 the Dyre & Hall ranch near Boulder, consisting of 1275 acres, and will drill for oil.

Modoc—This property at Ward, has been sold for a good sum to Buffalo and Chicago capitalists, who propose heavy developments.

Ward Gold Cyanide Milling Company—G. N. Davenport, of Ward, has arranged for the erection of a 75-ton cyanide mill on Indiana creek, to be used for custom ores of that section.

CLEAR CREEK COUNTY

Colorado Mill, Smelting and Power Company—New York people are interested with H. B. Clifford at the head of the company and they propose to erect a 1000-ton mill at the mouth of the Newhouse tunnel at Idaho Springs. The company has already arranged for the purchase of water rights, intending to furnish electricity for power plants.

Alpine—Fire, supposed to be incendiary, destroyed this mill at Idaho Springs, total loss being $75,000, with $20,000 insurance carried. Evansville, Ind., people were interested and it is reported that they will rebuild.

Consolidated Gem Mines Company—A large portion of the stock of this company, representing $2,250,000, is reported sold to New York capitalists by Colonel Guffey and J. H. Galey, of Pittsburg, Penn., and W. E. Renshaw, of Idaho Springs.

GILPIN COUNTY

Waltham—Shaft building and plant of machinery were destroyed by fire of unknown origin, Nov. 20, loss being $2500, partly covered by insurance. Britishers are owners.

Quartz Mill—Local lessees have opened up ore in the bottom of this shaft in Leavenworth gulch. Machinery and new buildings have just been completed.

Gomer & Pittsburg—A lease and option has been taken on these claims in Russell Gulch by C. A. King, of Idaho Springs, Colo. Machinery is to be installed and new buildings erected.

Imperial—The sum of $30,000 has been raised for the completion of the cyanide mill, and for deeper developments of the Mackey group, in Pine district. L. J. Mountz, Apex, Colo., is manager.

LAKE COUNTY—LEADVILLE

Car Shortage—The railroads are unable to supply the different mines with sufficient cars to haul away the ore and, unless the congestion is lifted within a few days, all of the large producers will be compelled to close down. Another serious matter that threatens the district is a coal famine, as the railroads during the last week are unable to supply the demand, and the situation is becoming worse daily. Local officials assure the mine managers that within a few days sufficient cars will be supplied to haul the ore, and that a coal famine will not happen. The situation, however, has curtailed shipments to a considerable extent, as all of the small shippers have been unable to send out their ore.

Fanny Rawlins—T. D. Kyle and associates have secured a lease on this Breece hill property for three years on favorable terms, and have started to put the property into shape. The St. Louis tunnel worked from the foot of the hill on the South Evans end-lines with the Fanny Rawlins, and there is an excellent body of ore at the breast of the tunnel, which is on the

line of the Fanny Rawlins, and from which 30 tons daily are being shipped. The present depth of the Fanny Rawlins shaft is 420 ft., and it will be sunk to the depth of the St .Louis tunnel to catch the ore. In the upper workings of the property there are large bodies of oxidized iron which will be shipped at once; at the 420-ft. level there is a fair body of lead sulphides, and when this is opened, the mine will be producing 50 tons daily, and when the other shoot of ore is reached in the neighborhood of 100 tons daily will be sent to the smelter.

Carbonate Hill—At present this section of the camp is very active, and from the Morning and Evening Star properties 400 tons daily are being shipped by the company, and different lessees. The Aetna shaft, lower portion of the hill, is still sinking, now being 400 ft. deep. The Little Nell, at the crest of the hill, during the week shipped two carloads of high-grade ore. The ore channel at the bottom of the shaft, 750 ft., becomes stronger as work goes ahead and the property is no longer considered as a prospect, but is now placed on the list of steady shippers.

TELLER COUNTY—CRIPPLE CREEK

The past week in this district has been noted for a general rise in the stock market of almost all the principal stocks. The reason for this is probably the generally good physical condition of most of the properties coupled with new strikes on some of them. Also the report that the drainage tunnel will undoubtedly soon be started has something to do with the rise. The completion of several mills in the near future is still another reason. The cold weather of the past few days has had the effect of decreasing the flow of surface water, which has been bothering the smaller operators for some time. The outlook for the treatment in the future of the oxidized low-grade ores in mills owned by the mines themselves is a cause for satisfaction.

Findley—Work will soon be started again on this property with a large force. The property has been idle for some time awaiting the completion of renovation of the Telluride mill at Colorado City, which is owned jointly by this company and the Golden Cycle. The mill will now soon be ready for business and the mine will commence operations again There is a large amount of ore in sight in the mine both blocked out and broken down. L. G. Carleton, of Cripple Creek, is president and general manager of the property.

Old Gold—This company has recently purchased some property in Esmeralda county, Nevada. The company owns a small but valuable area on Beacon hill in this district, adjoining the C. K. & N. and Henry Adney properties. At present the property is being worked under lease by Simonton and associates.

Raven Hill—The Jo Dandy mine on Raven hill is running the same as usual. There is also quite a little excitement on Tenderfoot hill. The Hoosier, which has been closed down for some time, is soon to begin work again by lessees.

GEORGIA

CARROLL COUNTY

Randall Clay Mining and Manufacturing Company—This company has been incorporated in Georgia to develop clay deposits near Carrollton. It is the intention of the company to prepare a product for wood-fiber plaster and a filler for fertilizers, working its mines to a capacity of 100 tons per day. T. A. Dolan, Aragon, Penn., is secretary and manager of the company.

INDIANA

Oil Production—Oil production in southwestern Indiana is increasing, a number of excellent wells being brought in during the week. Land that was valued at $40 an acre a few months ago is now held at $1000 to $2000 an acre.

GIBSON COUNTY

Princeton Coal Mine—This mine was sold Nov. 23 for $60,000. The purchasers are W. R. Glover, of Vincennes; the Hack & Simon Brewing Company, and several other manufacturing concerns of Vincennes. The mine was formerly owned by Hubbard & Ogle of Indianapolis. The parties bought the mine for the purpose of obtaining coal for their own industries.

KENTUCKY

CRITTENDEN COUNTY

Kentucky Fluorspar Company—This company is at present developing four mines—the Memphis, the Yandell, the Hodge and the Tabb. In addition it is running its fluorspar mill at Marion. The mines are well equipped with hoists and other machinery. This company is the oldest in the district, and has been a producer for a number of years.

LIVINGSTON COUNTY

Albany Mining and Investment Company—This company is operating the Nancy Hanks mine near Salem, and its shaft is now down 220 ft. The company has recently put up a mill for grinding fluorspar and a small mill for separating lead from the fluorspar. The company is owned by Muncie, Ind., people.

American Lead, Zinc and Fluorspar Company—This company, organized in Cleveland, Ohio, is operating the Morning Star mine, adjoining the Nancy Hanks. Two shafts have been sunk, and an adit has been run, which has exposed a vein of good width.

Eagle Fluorspar Company—This company, owned in Wheeling, W. Va., is operating the Eastern Star mine, near Salem. The main shaft is down 180 ft. The company is working on a process for separating lead and zinc ore from the fluorspar.

MARYLAND

GARRETT COUNTY

Blue Ridge Real Estate and Development Company—This company has been organized to exploit a copper deposit said to have been discovered on the Wolf property on South Mountain. Officers and directors are I. N. Snively, Waynesboro, Penn., president; John C. Entrican, Malvern, Penn., vice-president; Erich Krell, Philadelphia, Penn., secretary-treasurer; George P. School, New York; Samuel Musser, Yeagerstown, Penn., and Gideon Sibley, of Philadelphia.

MICHIGAN

HOUGHTON COUNTY—COPPER

Arcadian—No important developments have resulted from the work in the new exploratory shaft and no rich lode has been encountered. A lode which is quite wide and shows a little copper was intercepted in the crosscut from the bottom of the shaft, 200 ft. deep, but it cannot be positively identified as the Baltic lode, as reported.

Baltic—The addition to the stamp mill will be equipped with permanent machinery in a short time. It has a capacity designed for the equivalent to two heads, or 1400 tons of rock daily.

Calumet & Hecla—Work on the iron and brass foundry which is being erected at Calumet is progressing rapidly. The structural steel work is finished and work can now go forward on the interior of the plant without hindrance from inclement weather during the winter.

Champion—Steps will be taken to install permanent machinery in the addition to the stamp mill within the next three weeks, or after the experiments with the graded crushing system have been finished. Until then it will not be known what method of treating the rock will be employed in the addition.

Hancock—The old shaft has been unwatered and workmen are now engaged in cleaning out the refuse and débris. As soon as repairs are completed active mining operations will be started. It is expected drilling machines will be in use by Dec. 5. In barring down loose ground in the shaft and drifts considerable copper has been exposed. It is expected that the vertical shaft to open the Quincy, Hancock and other lodes traversing the property will be started next month. John L. Harris is superintendent and the mine office is at Hancock.

Superior—The Baltic lode has been encountered at the fifth level and good copper rock is reported. The formation was entered by crosscutting from the shaft a distance of 40 ft., but the lode was not penetrated at the time the report was made. However, sufficient good rock was laid bare to warrant the belief that the

fifth is as rich as the higher levels. In all of the levels the best ground has been encountered close to the point of contact between the crosscut and the lode and to south of these points there exists a channel of high-grade copper ground. The option held by the Calumet & Hecla expires Dec. 31, and if they take up the balance of their option they will control 50,100 shares, or the majority interest.

That the company will take this action is generally believed by those interested in the property.

Trimountain—All four heads in the stamp mill have been equipped with the steeple-compound cylinders and no further increase in the capacity of the plant is planned for the immediate future.

ONTONAGON COUNTY—COPPER

Michigan—At the stamp-mill site on Keweenaw bay, Houghton county, the shaft from the bottom of which a drift will be extended under Lake Superior to serve as an intake for the water supply has just been completed. It is 80 ft. deep, The foundation for the stamp mill is completed. Work on the superstructure will be started next spring. The plant is designed to contain one steeple-compound head at the start, with provision for the addition of a second head later.

Nonesuch—At this mine, under option to the Calumet & Hecla, work on the new stamp mill which will be used for testing the rock is rapidly nearing completion and stamping should begin in another month. The old mine workings are being extended in the more promising ground and diamond-drill explorations continue, James MacNaughton, Calumet, is general manager.

IRON—MENOMINEE RANGE

Exploration and development operations on the Menominee range, that have been very active all summer, are still as lively as ever. At one point—the Welsh or Commonwealth—Oglebay, Norton & Co., have ceased explorations, but they are still busy at the Buckeye, where they made a small shipment of ore this year, and will try to develop a large mine. On the Welsh an excellent vein was cut, but on further developments it pinched out. This company has let a contract to the Sullivan Machinery Company for a large amount of diamond drilling on the Pfister Land Company properties in the Michigamme valley, which they have secured. These lands have been partially explored with rather encouraging results, though no ore has been found on them. In their Seldon property at Stambaugh, Oglebay, Norton & Co., have made a very good find. They have been exploring there a year and have now cut a body of excellent blue hematite ore that seems wide and persistent, on exploration so far carried out. The work will be pushed with greater speed.

MINNESOTA

IRON—MESABI RANGE

Important extensions of the stripping pits of the Mesabi range are in contemplation, and the Oliver Iron Mining Company will have several large steam-shovel mines, each embracing two or three mines. The deepest stripping yet seriously considered for the range is that of the Shenango mine, where there is an average surface of about 108 feet. This is to be done during the coming year, and is an evidence of how the plan is extending its application. There are very few Mesabi mines that will not be stripped hereafter, unless special conditions prevent. The Oliver Company will have immense open pits at Eveleth and Virginia, in 58-20 and two or more around Hibbing, as well as the vast openings it is now beginning on in the new Coleraine region, near the western end of the range. It is safe to say that more dirt will be taken from Mesabi stripping mines the coming year than during any similar period of the past.

MONTANA

BUTTE DISTRICT

Boston & Montana—This company has ordered three new hoisting engines for use in various places, placing the order with the Nordberg Machinery Company, of Milwaukee. One engine will be placed on the Badger State, and another on the Leonard for use as an auxiliary. This company and others are having a hard time in getting their ores to the smelters on account of a shortage of railroad cars. Boston & Montana has ordered five electric locomotives and complete haulage equipment for use in its underground workings. It will do away with the horse-tramming system. All other Amalgamated companies are expected to follow this improvement.

Butte-Knickerbocker Mining Company—This new company is capitalized at $5,000,000 in 1,000,000 shares. It will operate the Jennie Dell, Twilight, October and Lamonte claims west of La France Copper property in Butte. Frank W. Childs, of Chicago, will be president, and George B. Conway, Thornton Hotel, Butte, vice-president and manager.

Butte Portland Cement Company—This company has been organized in Butte with a capitalization of $2,400,000 in shares of $100 each, for the purpose of building a 1000-barrel-a-day cement mill near Livingston, to work the cement deposits near Dunbar point and Logan, in Broadwater and Gallatin counties. There are 8000 shares of 7 per cent. preferred cumulative stock, and 16,000 common. The mill is expected to cost $600,000. Officers of the company have not been selected.

North Butte—This company has increased its output to 1200 tons a day, and is preparing to sink a 1600-ft. shaft on the Berlin group, 2000 ft. north of the Jessie. The sinking will be done on the Berlin claim, on which there is a two-compartment shaft 350 ft. deep, which was sunk by the Berlin company last winter. The old shaft will be the scene of operations and another compartment added to the portion already sunk. Skip pockets and chutes have been placed in the main shaft and all of the levels. Driving for Berlin ground from the 1200 and 1600 of the Jessie is progressing slowly, and will reach the perpendicular of the new opening in Berlin before the latter is down.

FERGUS COUNTY

Barnes-King Development Company—Organized to take over the gold property of the Barnes-King Mining Company at Kendall. Its capitalization is $2,000,000 in 400,000 shares. Only the directors have been elected. The new company will double the capacity of the mill.

NEW MEXICO

SIERRA COUNTY

Southwestern Lead and Land Company—This company, operating on the east slope of the Ceballos range, is nearing the producing stage.

Victoria Chief—This company, on the west side of the Ceballos range, has secured control of the copper district, including the Marian and Ohm mines, that appears to be on the extension of the lead-bearing fissures from the east flank. There the fissures cut limestone, but on the west side they cut quartzite, and bear copper instead of lead ore. The new company is improving extensively, and is building a wagon road through the Palomas gap to Palomas, which will be used for handling copper ores from the mines to Cutter, by means of a 50-h.p. gasolene traction engine. The mines are dry, and water will be provided by a gasolene pump at the Rio Grande river some four miles away. It is planned to erect a smelter, and a suitable site has been selected south of the mines.

SOCORRO COUNTY

Magdalena District—The Mine Development Company, of Socorro, has acquired the Stonewall Jackson group, from which considerable lead and zinc ore has been shipped in former years. About six cars of zinc ore are leaving Kelly daily. Of these, five are shipped from the Kelly mine by Jacobsen & Co., of Denver, the lessees. The Jacobsen's ore contract expires Jan. 1, 1907, and it is expected that thereafter the Kelly mine ore will be handled direct by the owners, the Tri-Bullion Mining Company. A new two-compartment shaft has been started on the Kelly, and is already down several hundred feet. The Graphic company has cut the Silver Pipe horizon with its Waldo adit, and is now drifting north and south to explore for orebodies.

RIO ARRIBA COUNTY

Bromide District—Tres Piedras is the nearest railroad point to the Bromide district, seven miles away, and as the topography is gently rolling the building of wagon roads to the mines is inexpensive. The country rock is largely mica schist, and the ore in demand at present is copper, though there are also silver mines, as the Sixteen to One and Bromide, and gold mines, as the Red Fissure, Danbury and Gold Pan. Many of the veins were leached on the surface, and only showed copper values with depth. The deepest shaft, at the Tampa mine, is below 400 ft., and still being sunk by the Tusas Peak Mining Company. This company is also finishing a 75-ton mill, that was designed by Colonel Woodbury, of Denver, and is a combined concentrator and leacher.

The New Mexico Gold and Copper Mining Company is actively working its Strawberry group. Eastern parties have been looking at the Spring creek group, owned by William H. Ashton, the first locator of the Bromide district. The Red Fissure and Admiral groups (each owned by a company of the same name), the War Eagle of the Mexican King Gold Company and the Cow Creek of the Pennsylvania Company and the Danbury, of J. P. Rinker, are more or less active. On the whole claim, the orebody was missed by the original owner, but the purchaser, Otto Rosenfeld, has found a pay streak, 3½ ft. wide, carrying copper with the precious metals; he will equip the shaft with a steam hoist. One of the largest land owners in the Keystone-Bromide Company, which has 40 claims, including the Pay Roll mine.

NEVADA

NYE COUNTY—TONOPAH

Ore Shipments—Shipments of ore over the Tonopah Railroad for the week ending Nov. 22 were: Tonopah Company, 1100 tons; Tonopah Extension, 405; Belmont, 370; Midway, 49; Jim Butler, 44; West End, 28; total, 1996 tons. In addition to this the Goldfield shipments were 1700 tons, making a total of 3696 tons.

Montana—The work of re-timbering the main shaft has been completed and operations underground have been resumed. It is the intention of the management to restrict ore shipments until the company's mill, now in course of construction, is completed. Sufficient general development has been done in the mine to allow of cessation for a while; but the systematic blocking out of the orebodies already exposed will be continued. Only the ore taken out in the course of such operations will be shipped, as the cost of transporting such ore to the smelters in Salt Lake is $20 per ton and it is desirable to reserve the ore for local treatment and thus save such a heavy loss.

California—The work of cutting a new station at the 250-ft. level is nearly finished, and arrangements are being made to run a crosscut to tap the vein discovered in the 150-ft. level. The south drift on the 150-ft. level has exposed an ore-shoot over 30 ft. in length, assaying $80 per ton. Two shifts are engaged in driving a raise from the 414- to the 250-ft. level and the rate of progress is over 14 ft. per day. The raise is following a very rich ore shoot carrying brittle silver (stephanite).

Great Western—Good progress is being made in sinking the shaft, which has now been sunk 280 ft. The shaft is passing through a wash and will soon enter the andesite. It will require to be continued about 250 ft. farther before it will be sufficiently down in the vein-bearing andesite to enable crosscutting being undertaken.

NYE COUNTY—HANNAPAH

Tenderfoot—A well defined vein, 3 ft. in width, carrying good values, has been cut. It is proposed to put on another shift to run the shaft down as quickly as possible and allow development work being undertaken.

Cuddy—Good progress is being made in developing this property. Recently the directors visited the mine, and the prospects having improved, a vigorous course of action was determined on. Work will also be resumed shortly on several of the adjoining mines, and the camp promises to boom early next spring. Good assay results have been obtained over a large area of the field; but development work has been delayed by the difficulty in securing capital.

WASHOE COUNTY

Wonder—Work is being prosecuted on all the properties of this camp. On the Jack Pot there is a 30-ft. shaft sunk on the ledge, showing up a 3½-ft. ledge of rich ore. There are 500 sacks of it on the surface. The ore is principally a sulphide, with silver giving about two-thirds the values, and is said to be similar to the Tonopah ores. Three shifts are working on the Nevada Wonder, the property after which the camp was named. A tunnel has been run in 60 ft., which crosscuts the ledge. The ore is said to average $50, and is 11 ft. across. The Wasp & Spider group, five miles north of Wonder, has shipping ore in four places. Other properties which are showing encouraging signs on development are the June Wonder, the Extension and the Higgins property.

Olinghouse—The new railroad which is being built from Wadsworth to the camp is rapidly nearing completion. The road is broad gage, with no grades exceeding 8 per cent., and will connect with the main line of the Southern Pacific at Wadsworth. Trains should be running soon, and shipping will at once commence from the mines of the district, the Green Hills, the Texas Nevada, the Springfield Nevada, Keystone Nevada and Buckeye-Buster. The completion of this railroad, together with the building of the 60-stamp mill on the Truckee, only 10 miles from camp, should give this district advantages and enable it to treat its large deposits of low-grade ore at a minimum of expense.

OREGON

BAKER COUNTY

Mormon Basin—A. L. Longstreth, operating the Marseilles group in the Mormon Basin camp, 35 miles southeast of Baker City, has a 150-ft. tunnel in on his property and has opened a ledge 3 or 4 ft. wide of ore that averages $8 to $12 to the ton. The formation is slate and porphyry and the ore is free-milling. Other properties in development are the Rainbow, which has milling ore, the Frisco, the Morning Star, the Tarbell, and the Oregon Chief. The camp is a new one.

GRANT COUNTY

Standard Consolidated—The original plant of this company, near John Day, built according to the recommendations of H. H. Nicholson, consulting engineer, after tests and experiments on the mine ores, showed that a good saving of values could be effected by a simple concentration process. Sets of Allis-Chalmers crushing rolls, giving the mill a daily capacity of 100 tons, will be in operation by the end of November. Those rolls are designed to crush 35,000 tons of ore per year. The company owns nearly 700 acres of land covering the Standard vein system for over 6000 ft. in length. Close to 10,000 ft. of underground work has been done and orebodies have been explored to a depth of 600 ft. in the main vein, so that sufficient ore is now blocked out to keep the mill in operation at full capacity for several months.

PENNSYLVANIA

ANTHRACITE COAL

Beaver Brook—Six hundred men and boys employed by Dodson & Co., at the Beaver Brook colliery, went on strike last week because the pay-day was delayed a day owing to the holidays.

Philadelphia & Reading Coal and Iron Company—This company's statement for October and the four months of the fiscal year from July 1 to Oct. 31 is as follows:

	October.	Four Mos.
Earnings	$3,703,813	$10,242,183
Expenses	3,454,067	9 932,141
Net earnings	$249,746	$310,342

For the four months there was a decrease of $196,547 in earnings; an increase of $59,760 in expenses; and a resulting decrease of $256,307 in net earnings.

SOUTH DAKOTA

LAWRENCE COUNTY

Imperial—The outside work, which cannot be done on this property during the

winter season, is practically completed, and a large amount of dead work is being done. The chief development work is being done on the Baltimore claim, where the 45-ft. drift has cut 15 ft. into a body of good ore.

Gilt-Edge Maid—The semi-monthly clean-up at this mine was satisfactory. Ore running less than $3 a ton is being treated at a total cost for mining and milling of not more than $1.20. It is believed that this can be reduced. The mill is treating 180 tons a day, and it is the purpose of the management to increase the daily tonnage to 200 tons.

Branch Mint—The work of hoisting ore has commenced and the rock is being put through the crushers, whence it is carried on belt conveyors to the ore bin. This will hold sufficient ore to run the mill for one month. Work on the slimes annex is going on satisfactorily.

Queen Esther—This company has just been organized with a capitalization of $1,250,000, shares of the par value of $1. Its holdings include 380 acres of land on Iron creek, two miles from the Burlington station. Considerable development work has been done, and some good cyaniding ore, running about $4.60 to the ton, has been opened. The officers are: Allen Kingdon, president; J. M. Jarvis, vice-president; W. W. Connor, secretary; all of Niles, Ohio.

PENNINGTON COUNTY

Tamarack—A force of men is now at work on this property running a crosscut tunnel to tap an orebody which crops out on top of the hill. The workings will tap this body at a depth of about 350 ft. It is free-milling ore.

Pactola Copper—A deal has just been completed whereby New York people come into possession of a large acreage, which has a copper showing. The property has been owned for years by J. C. Sherman, and a large amount of development work has been done on it.

TENNESSEE

CLAIBORNE COUNTY

Tennessee Zinc Company—This company, whose mines are located near New Tazewell, has been operating a 100-ton concentrating mill since the latter part of May of the present year, and development has gone steadily forward. Within the past month the company is said to have uncovered a body of zinc carbonate, and is now opening a body of sulphide. It has decided to increase its present facilities by adding to its boiler capacity, erecting a larger pump, installing a magnetic or electrostatic separator, and will probably build an oxide burner, the improvements to be made within the next two or three months and to cost about $50,000. It is stated that the Southern Railway is preparing to construct a siding at the nearest point of its line to the mines, in order to facilitate shipments of ore, some of which are now being made from New Tazewell. The headquarters of the company are in Cincinnati, Ohio.

HAMILTON COUNTY

Tennessee-Gem Coal Company—This company has organized with G. H. Holliday, of Knoxville, Tenn., president; Lot Davis, of Ironton, Ohio, vice-president and general manager; and Walter C. Holliday, of Knoxville, secretary-treasurer. Leases have been obtained on a tract of coal land in the Walden's Ridge district near Chattanooga, where mines will be opened and coke ovens constructed. It is reported that this company will probably be interested in building a coal-carrying railroad and a bridge across the Tennessee river at Chattanooga.

MARION COUNTY

Dixie Portland Cement Company—This company is preparing to build works at South Pittsburg, with a capacity of 2500 bbl. of portland cement daily. George E. Nicholson, of Iola, Kan., is president; A. B. Cockerill, Nevada, Mo., vice-president; L. L. Northrup, Iola, Kan., treasurer; Richard Hardy, Detroit, Mich., secretary. The engineer in charge of plant is Leigh Hunt, of Iola, Kan. The equipment will include 10 rotary kilns, each 8 ft. in diameter by 110 ft. long, for burning the cement. The steam plant will include water-tube boilers and cross-compound engines for 4000 h.p. The driers will be four in number, 6 ft. in diameter by 60 ft. long. South Pittsburg is adapted for this enterprise, there being plenty of lime rock, shale and water at hand, with ample transportation facilities.

TEXAS

EDWARDS COUNTY

United Kaolin Properties Company—This company, which has its headquarters in Chicago, has bought a property near Leakey, which is said to contain a deposit of kaolin.

UTAH

BEAVER COUNTY

Talisman—This company is installing hoisting equipment, after which shipments will be increased. The manager, P. B. McKeon, of Salt Lake, says there is over $200,000 worth of silver-lead ore blocked out in the mine.

JUAB COUNTY

Mammoth—The shaft is down 2100 ft., with a winze down to the 2250-ft. level. Owing to the character of the ground it is difficult to keep the shaft in repair below the 600-ft. point. It has been decided to put in another double-compartment shaft in another part of the property.

Annandale—Sinking of a double-compartment shaft at this property has begun.

SUMMIT COUNTY

Odin—This company, operating in Thaynes cañon, near Park City, after drifting for 110 ft. on the Odin vein, has opened into a full breast of ore, which averages 19.8 per cent. copper, 11 per cent. lead, 16 oz. silver and $1 in gold. W. I. Snyder, of Salt Lake, is manager.

TOOELE COUNTY

Utah Mine—This property is producing a great deal of high-grade silver-lead ore. Two cars sold this week netted $8154; one lot averaging $104.96, the other $121.85 to the ton.

VIRGINIA

LOUISA COUNTY

Arminius Chemical Company—This company has filed articles of incorporation, with offices at Arminius Mines, Va. The incorporators are J. F. Kernochan (president) and H. H. Mann, of New York City; G. A. Wingate, of Brooklyn, N. Y.; G. P. Hill, of Ridgewood, N. J., and several others. The company proposes to mine sulphur, pyrites and other ores. The company has New York offices at 56 Wall street.

WASHINGTON

FERRY COUNTY

Keller & Indiana Smelting and Development Company—The smelter buildings and installation of the machinery are completed, but arrangements for the delivery of coke have not yet been made. The machinery has been put in motion and works well. Men are employed blocking out ore in the Gold Cord mine. The company talks of starting up the Byrne group, a silver-copper property.

Meteor—This mine, in Meteor camp, W. A. Halteman manager, has been operated steadily during the past two years. Two shafts were sunk, presumably on different veins. One of them is 120 ft. deep. Drifts have been about 40 ft. each way on the veins on both the 76-ft. and 120-ft. levels. The vein is about 4 ft. wide between the walls, and the pay streak is from 8 to 18 in. wide. This vein lies between porphyry and schist. The other vein runs parallel with it, about 200 ft. northward, is 6 ft. wide, and goes down in rhyolite. A shaft has been sunk on it 55 ft. deep. A tunnel is being driven to tap the veins at from 300 to 350 ft. deep.

Gwinn—A 3-ft. streak of ore was encountered since the mine was bonded, said to look very rich.

WEST VIRGINIA

The special commission appointed by Governor Dawson to suggest changes in the mining laws has met and decided to submit three different reports to the legislature for consideration. A majority will submit one; John Nugent, representing the miners, will submit another, while E. L. Judy, representing the operators, will submit a third. Mr. Nugent, for the miners, wants drastic legislation, and Mr. Judy wants the majority report modified.

Foreign Mining News

MEXICO

GUANAJUATO

Guanajuato Amalgamated Gold Mines Company—At a meeting of the board in New York, Oct. 19, George Karsch was chosen president, to succeed Albert J. Adams, deceased. William M. Thomas was chosen secretary and treasurer, in place of Mr. Karsch.

SONORA

Cieneguita Copper Company—This company is extending its plant at Tarochi, and has ordered of the Traylor Engineering Company, of New York, a reverberatory furnace, a set of crushing rolls, a Blake crusher and a centripact screen. The crushing rolls and the Blake crusher are sectionalized for mule-back transportation, and the other machinery is so designed that no single part shall be too heavy for this method of carrying.

Coal Trade Review

NEW YORK, Dec. 5

The coal market in the East has been strengthened by the coming of the first really cold weather of the season. Domestic buying has started up briskly, and the coastwise trade has also been benefited.

In the West the railroad situation is becoming serious. In many places the coal supply is short, and there is no present prospect of improvement. The mines are held up in many places, work depending entirely on an intermittent car supply.

COAL-TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Nov. 24 were as follows, in short tons:

	1905.	1906.	Changes.
Anthracite	4,117,673	4,056 818	D. 60,855
Bituminous	27,064,042	28,933,391	I. 1,869,349
Coke	10.086,953	11,407,067	I. 1,320,114
Total	41,268,668	44,397,276	I. 3,128,608

The total increase this year has been 7.5 per cent.

New York Dec. 5

ANTHRACITE

The hard-coal market has lately been stimulated somewhat by cold weather, but shortage of cars still remains acute and prevents shippers, in many cases, from taking advantage of the active market. Broken and egg coal are the only sizes that are in abundant supply, all smaller sizes being exceedingly scarce, the steam sizes particularly so. The action of the Philadelphia dealers in putting pea coal on the list of domestic sizes, at an advanced price, has not yet been duplicated in this city, and probably will not be, since Philadelphia is supplied by line trade, while New York is a tidewater point.

Prices remain unchanged at $4.75 for broken, and $5 for egg, stove and chestnut; for steam sizes, $2.80@3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice; and $1.30@1.35 for barley, all f.o.b. New York harbor shipping points.

BITUMINOUS

The Atlantic seaboard soft-coal trade is exceedingly active, and the demand is now larger than the supply. Car shortage is still the predominating feature and it keeps the market continually short of coal. Prices are quoted around $2.70 for the lower grades, and $3 for better grades, f.o.b New York harbor shipping points, with very little coal to be had. Orders for shoal-water delivery are particularly numerous just now, on account of cold weather, and shippers are giving them the preference.

Consumers in the far East are placing their orders freely and demands are accumulating in shippers' hands. Trade along the Sound is also active; few consumers are receiving as much coal as they want, partly on account of the shortage of Sound vessels. Trade in New York harbor is brisk, with not enough coal to go around. All-rail shipments are heavy, with prices around $1.50 f.o.b. mines, for fair grades of steam coal, and not much offering at this price.

Car supply ranges from bad to a little better, according to the producing district. Some territories do not get more than one-tenth and none gets more than one-half of its requirements. Vessels in the coastwise market are in sufficient supply to handle the present amount of coal coming forward. Current rates from Philadelphia on large boats are quoted at $1 to Boston, Salem and Portland, and 85c. to the Sound, with the loading and discharging clause.

Birmingham Dec. 3

The coal production in Alabama is being seriously interfered with by the railroad-car shortage. There is a demand for every ton of coal that can be mined. The car shortage promises to last through the entire winter. The Southern Railway is reported to have 1200 cars under repairs in this district.

The Tennessee Coal, Iron and Railroad Company has let contracts for the extension of the Birmingham Southern Railroad 13¼ miles from Pratt City to Booker City, where there is a large tract of coal lands. It is stated that these lands will be developed on a large scale and two or three mines opened up at once.

Coal washers started on in the Pratt City district by the Tennessee Company are nearing completion and in a few days will be in full operation. The company expects to increase the quantity and quality of its coke. There is a strong demand for all the coke that can be manufactured.

Chicago Dec. 3

Mild weather has made the last week a stationary period for the wholesale coal trade. The first severe cold wave, however, will bring a rush of orders for both bituminous and anthracite, and in anticipation of this dealers are bringing all the pressure possible to bear on the railroads for betterment of the car supply. In the city there is considerable demurrage coal from Illinois and Indiana mines—almost wholly screenings and run-of-mine. Prepared sizes are especially in demand, as regards Eastern coals, and the market is firmer for them than for Western. Hocking alone of the coals coming from east of Indiana is somewhat weaker, and the circular price of $3.65 on 1¼-in. lump has been shaded by 10@20c.

Illinois and Indiana lump and egg sell for $2@3.25, run-of-mine for $1.75@2.25 and screenings for $1@1.50. Brazil block is in good demand and short supply, selling for $3.20@3.30. Youghiogheny is still difficult to obtain and has advanced to $3.90@4. Pittsburg is very scarce also, 1¼-in. lump bringing $3.40. Smokeless is firm, as regards lump and egg, which bring, for Pocahontas and New River, $4.30. Run-of-mine smokeless is somewhat weak and does not hold firmly to the circular price of $3.40. Cannel is still very scarce, a condition attributed to car shortage, and sells for $5.15.

Anthracite is not so active as in previous weeks, but wholesalers are urging retailers to lay in supplies while mild weather lasts, and the advice is being heeded by many. The cold wave of the last two or three days in the Northwest has resulted in large orders for anthracite from that region and Western trade is reported much better than that from the territory adjacent to Chicago. Chestnut is still very scarce and in great demand.

Cleveland Dec. 4

The coal situation in this territory is a matter of cars. The supply of cars is barely sufficient to meet the demand of this immediate territory for coal and the result is that no one is able to get any stocks ahead. The market is running hand-to-mouth.

In view of the strong demand it would not be surprising, when cold weather comes to bother the railroads, to see a further advance in the price. At present mine-run steam coal is selling at $1.50 at the mines for both Ohio and Pennsylvania; three-quarter at $1.60 or better and lump at $1.80 at mines. Slack, however, is still, comparatively cheap, the Pennsylvania product selling in this territory at 85c., which is less than the price paid in the Pittsburg district.

The lake movement is still slow, due to the same shortage of cars. The shippers, while not being able to fill contracts, are still sending as much coal forward as possible and announced yesterday they would

have coal until hull insurance expires on Dec. 12. Some few cargoes will be shipped after that, in boats running without insurance. The northwestern situation is somewhat relieved during the week by the announcement that heavy movements are taking place from the mines farther west.

The coke market is exceptionally strong. The demand for foundry coke on contract is still strong and the price holds at $4.25 at the oven for 72-hour, while furnace coke is selling at $3.35@3.50 at the oven. The car shortage is a factor there also.

Indianapolis Dec 3

The continued drought and water shortage has become a serious obstacle to the operation of mines in many places in Indiana. It has been two months since the ponds at any of the mines have been replenished and many are entirely dry, necessitating the hauling of water for the engine boilers at the mines.

The increasing shortage of coal cars in the block-coal district has resulted in the coal miners and operators being at swords' points over a provision in the contract that the company shall pay each of the miners a fine of $1 in case it calls the miners to work and there are no cars.

The miners of Zeller No. 2 mine and the Brazil Block Coal Company No. 7 mine filed a complaint with the executive board of District No. 8 and a meeting of the board was held to take up the matter with the operators. The miners said in two cases they had been called and, after waiting an hour, no cars appeared and the company had refused to pay the fine. The company said the cars had been promised in time for work and the blame is on the railroad company. The miners are not satisfied with this excuse, since the operators signed a contract agreeing to pay the fine in such cases, and are now insisting that they live up to the agreement. The miners also complain that they have to walk home when called out and find no work, many living at a distance from the mines. The miners' officers and operators' committee failed to reach a settlement of the trouble and will have another meeting soon. The miners demand that the operators agree not to call the miners to work unless they are assured of sufficient cars for a day's work. The operators are anxious not to miss a day's work and do not wish to make such an agreement, but they may be forced to do so, or the miners will be called out.

Pittsburg Dec. 1

Coal—There is but little change in the situation. The mines are being operated as fully as the railroad-car supply will permit, which is about one-half their capacity. The Pittsburg Coal Company this week has been getting about 60 per cent. of its requirements, while some of the small independent concerns receive about 40 per cent., or less. Almost the entire production of the leading interest last week was sent to lake ports for shipment to the northwestern markets. The car shortage will prevent the company from filling its contracts, but it is expected that the shipments will be a trifle larger than last season. Prices remain firm on a basis of $1.60 a ton for mine-run coal at the mine. To old customers this rate is shaded, but some urgent orders have been filled at a higher price.

Connellsville Coke—Furnace coke is held firmly at $3.50 for December and January shipment, and at $3@3.25 for deliveries extending through the year. Foundry coke is higher this week, being quoted at $4@4.25 for prompt and first quarter. For the first half $4 is quoted, and for shipments through the year contracts are being made at prices ranging from $3.75 to $4. The production for the week, according to the *Courier*, amounted to 285,126 tons, a gain of about 4000 tons over the previous week. The shipments aggregated 15,458 cars distributed as follows: To Pittsburg, 5014 cars; to points west of Pittsburg, 8633 cars; to points east of Connellsville, 1711 cars. The production in the Lower Connellsville region amounted to 116,783 tons.

San Francisco Nov. 29

The prices of coal have been materially advanced in San Francisco and neighboring cities. Foreign coal is mainly used for domestic purposes and the general raise is about $3 per ton wholesale. The retail dealers have nearly doubled this.

The Independent Oil Producer's Agency has signed a contract with the Associated Oil Company for the whole output of its Kern river field oil at 27½c. a bbl., the output being about 700 bbl. a day. For the past year only 18c. a bbl. has been received.

Foreign Coal Trade

Dec. 5

The foreign coal trade of Belgium for the 10 months ending Oct. 31 was as follows, in metric tons:

Imports:	1905.	1906.	Changes.
Coal	3,374,970	4,430,454	I. 1,055 484
Coke	297,472	294,517	D. 2,955
Briquets	52,627	110.191	I. 57,564
Total	3,725,069	4,835 162	I. 1,110,093
Exports:			
Coal	3,904,970	4,210,105	I. 305,135
Coke	826,087	713,139	D. 112,948
Briquets	405,146	386,575	D. 18,571
Total	5,136,203	5,309,819	I. 173,616

The total exports exceeded the imports by 1,411,134 tons in 1905, and 574,657 in 1906.

Iron Trade Review

New York, Dec. 5

Conditions in the iron and steel trade show little change. If anything, business is a little less pressing, and there are indications of a quieter interval as the end of the year approaches. This will not mean any depression, but simply a breathing space, which will be rather welcome than otherwise.

Foreign pig iron continues to come in, but American buying seems to be putting up prices. If this movement continues they may reach a point which will check shipments.

Baltimore Dec. 4

Imports at the port of Baltimore for the week just closed included 3058 tons of spiegeleisen and 199 tons of ferro-manganese. There were also 150 tons of manganese ore. A cargo of 5300 tons of iron pyrites was received from Spain. Imports of iron ore were six cargoes, 28,300 tons, all from Cuban ports.

Birmingham Dec. 3

The railroad-car shortage has caused considerable accumulation of pig iron in the Birmingham district. The shortage, together with the strong demand that has been on for some weeks now, has brought about a condition that iron to be delivered before April 1 is all termed spot iron, almost, and no iron is selling for delivery within that period under $22 per ton, No. 2 foundry. Silver gray or high silicon iron has been selling in this district at $26 per ton. The Sloss-Sheffield Steel and Iron Company anounces that it has 23,000 tons of pig iron in the furnace yards which should have been forwarded to consumers, but on account of the bad transportation facilities has had to pile up in this district. Other companies are just as badly delayed in filling their contracts.

There is still a lively sale of iron noted in this district for delivery during the second quarter. No. 2 foundry iron for delivery after April 1 is bringing $19 per ton in some quarters, and at no place under $17.50.

Announcement is made that, effective Jan. 1, an advance of 25c. per ton would be made in freight rates on pig iron and kindred products. The manufacturers do not relish the advance, but so far there has been no complaint raised.

Chicago Dec. 3

The iron market continues quiet, but firm, the chief demand being for small lots of either Northern or Southern iron, available for quick delivery. On such lots the high prices of the last two or three weeks continue, Northern No. 2 being quoted, for carlots in transit, at $25.50 @26.50 and Southern No. 2 at $21@22 Birmingham, or $24.90@25.90 Chicago. These prices apply to any deliveries before April 1, 1907.

Prophecies have been made that the available iron for spot sales would soon be exhausted, but there seems to be a good deal obtainable in the local market

at the speculative prices. Melters are reluctant now to cross the imaginary line separating 1906 from 1907, and the month probably will see large activity in quick-delivery lots, but little extensive contracting for next year's needs. Furnace agents profess to be satisfied with the present condition of things and say there will be plenty of contract making after the first of January.

There is much demand for malleable bessemer for quick delivery, as well as on contracts, at $23@24 on contracts and $27@28 on deliveries before the end of the first quarter. Coke is still scarce and 72-hour Connellsville brings $6.90 per ton.

Cleveland Dec. 4

Iron Ore—Vessel owners have begun laying up their boats for the winter, which indicates that the season of navigation for this year is about at a close. This, however, has little influence on the movement of ore, which is practically completed at any rate. Most of the vessel owners have already completed the movement of the ore on contract, while all others have their last boats now on the way down the lakes. The November movement of ore has not been compiled, but estimates are that the tonnage will exceed 4,000,000 and therefore that the total movement for the season will reach, if not exceed, 38,000,000 tons. During the week some of the shippers of ore have placed their ore for 1907 delivery with vessel owners who accepted the old rate of 75c. from the head of the lakes; 70c. from Marquette and 60c. from Escanaba. This indicates the shippers are in control of the rate situation and promises to bring about a stable rate policy on the lakes.

Pig Iron—Producers of pig iron have again adopted a conservative policy. As far as this territory is concerned the supply of pig iron for immediate shipment is largely in the hands of one big interest which continues to sell No. 2 foundry for spot shipment and through the first quarter at $25 in the Valleys. Higher prices could be obtained if desired. This is largely due to the information that little relief is to be expected from abroad. Second-quarter material is still selling at $23@24 at furnace, although prices are working higher for that delivery. Last-half material is selling at $22 at furnace, with some furnaces holding for $23, and others expressing the belief that by holding off they will be able to dispose of their second-half iron at $25, this stand being based on the known conditions abroad. Basic and bessemer are off the market for the present and there is a good demand for second quarter next year, with further buying for second half.

In these grades prices are almost identical with those in the foundry trade. It was announced this week that an arrangement has been made whereby the Upson Nutt Company will reassume control of River furnace in Cleveland, which has been leased for several years to Corrigan, McKinney & Co. The change in control takes place Aug. 1 next year.

Finished Material—Although the steel-plate pool is out of existence, there has been a horizontal advance in the price of steel plates. The price moves up $2 a ton. Tank plate and boiler plate are now selling on the same basis as structural, at 1.70c. Pittsburg, while flange steel is selling at 1.80c. Pittsburg. Billets are still strong, with prices moving up for immediate shipment. Many mills are offering forging quality in this territory on the basis of $40@41 delivered.

New York Dec. 5

Pig Iron—The market has been a little quieter, and business has been chiefly in small lots to fill up corners. Prices have been irregular, depending chiefly on deliveries wanted, and the range is wide. In one or two cases $27 is reported paid for No. 2X foundry, but this cannot be verified.

Scotch pig is held at $24@24.50 ex-ship, duty paid; Middlesboro pig at $24 for No. 1 and $23 for No. 2, same terms.

Current quotations for pig iron are for New York or parallel delivery.

Northern:	
No. 1 X foundry	$24@$26.50
No. 2 X foundry	23.50@26
No. 2 plain	21.50@24
Forge pig	20@21.50
Southern:	
No. 1 foundry	23.50@27
No. 2 foundry	23@26.50
No. 3 foundry	22@23.50
No. 4 foundry	21@22.50
No. 1 soft	24@27
No. 2 soft	23@26.50
Gray forge	20@21.50
Basic pig:	
Northern	22@23.50
Virginia	22@23.25
Alabama	22@23.50

City or local deliveries are not included in prices, which are for large lots, on docks or cars.

Cast-iron Pipe—Sales of nearly 20,000 tons for spring delivery are reported. For second and third quarters $34.50 per ton is quoted for 6-in. pipes, carload lots, at tidewater, with many foundries asking $1 more.

Bars—Bars are strong at 1.845c. tidewater, for common iron, while refined is 1.895c. Steel bars are quoted at 1.745@1.845c., according to size and conditions of orders. Store trade is good at 2.50c. delivered.

Plates—There has been an advance of $2 per ton for all reasonably early deliveries. For tidewater delivery, carload lots, prices are: Tank, 1.845@1.945c.; flange, 1.945@2.045c.; marine, 2.245@2.345c., according to width.

Structural Material—New orders are mainly for small lots. Prices are nominally unchanged, but premiums continue to be paid to secure deliveries.

Rails—There have been some sales of old steel rails fit for re-laying in sidings, etc.; mainly of lighter sections. Trolley-rail contracts are under negotiation for new lines in New York, and for some Massachusetts roads for repairs.

Old Material—Dealers are on the war-path for scrap to fill orders. Buyers are protesting against prices, but have to pay. Steel melting scrap is badly wanted and brings $16.25@17; No. 1 yard wrought is $18@19; machinery cast, $17.50@18.50 These prices are for New York and vicinity.

Philadelphia Dec. 5

Pig Iron—The pig-iron makers who have sold up their capacity a long time ahead regard with a good deal of concern the more or less artificial prices prevailing to-day which benefit them nothing. Notwithstanding the apparent flurry in the market, our market is rather quiet, as so many consumers have supplied their requirements and are quietly melting up iron and watching the excitement. At the same time there is a great deal of negotiation going on quietly, looking to the importation of foreign iron during the first six months of the coming year. About one-half of the purchases made are of Middlesboro iron, and the balance Scotch. Negotiations are pending to-day for the delivery of English iron during March and April, and if the quotations made two weeks ago will stand, the arrangements will be closed before the end of this week. There is very little pig iron changing hands. A number of our people are complaining this week that the deliveries of iron are beginning to fall behind and they are stirring up the shippers, who in turn wire that it is the fault of the railroads. The present tendency in prices is certainly upward and the pig-iron makers themselves regret this upward tendency more than anyone else. Quotations are hard to give, but $26 may be given as a fair figure for No. 1 X foundry; $25 for No. 2; $24 for No. 2 plain; $22 for standard forge; $23 for basic; $22.50 for Middlesboro on dock, and $24 for Scotch on dock.

Steel Billets—The mill people have been obliged to refuse some business that was offered them this week. The present average quotations are $34 for rolling billets, and from $2 to $6 higher for forging billets, according to quality.

Bars—The advance that has been made appears to have stimulated retail business, both at the mills and stores.

Sheets—Sheets are selling a little higher than last week in retail lots.

Merchant Steel—Merchant steel has moved up fractionally in price in all stores in this territory.

Plates—Negotiations have been started within a day or so for considerable quantities of plate at the advance of $2 per ton. This advance has rather stimulated inquiry at least.

Structural Material—The only business

spoken of is in shapes. Comparatively small lots are under inquiry by engineering firms and builders, who have secured contracts for the erection of warehouses and other buildings.

Scrap—The scrap consumers are scratching in material wherever they can get it. Our territory has been invaded by Western buyers, who have scooped up considerable scrap which our people expected to control and they offer prices which our people have no notion of paying. The effect of all this is that scrap quotations have gone up, and it is impossible to tell what scrap will bring until the last buyer has had his say. Choice railroad scrap would sell to-day at $24, and machinery scrap at $20.50@21. No. 1 steel scrap is wanted at $20, and there is none in sight. Wrought-iron pipe scrap sold in small lots at $17.50 per ton.

Pittsburg Dec. 4

As had been expected, the price of plates was advanced $2 a ton and quotations are now on a basis of 1.70c., Pittsburg. This rate was established in the East recently, although premiums have been paid for prompt shipment. The rate of 2c., however, is only named for small lots. The advance in plates accounts for the renewed and heavy buying of structural material, as consumers are evidently anticipating an increase in the prices based on shapes at 1.70c., which were established on Aug. 31, 1905. Nearly all lines of finished-steel products have been advanced within the past two months, and it does not seem unlikely that structural material should be increased. Prices practically are higher than the ruling rate, as the mills are crowded with orders, and it is almost impossible to take on any new business for delivery this side of July 1.

The demand for sheets is unusual and the mills are sold up through the first quarter, and a number have orders that extend into the second quarter. Heavy premiums are being offered for prompt delivery, but the business is being rejected, as to fill new orders would throw the mills further behind in deliveries on old contracts.

The tin-plate plants are being operated as fully as the supply of material will permit, and the month opened with production at the highest point in the history of the industry. Heretofore, a number of plants were closed late in September and in October while the product of the mills operating was stored for the spring trade. The canning interests have entered the market early, and there seems to be an impression that another advance may be ordered shortly. The last advance was 15c. a box to $3.90, which was made on Oct. 25. Tin-plate bars are difficult to get at the established price of $30, and pig tin has advanced to 43.25c. a pound, and may go higher. The tin market is irregular, and all efforts of consumers to put it on a stable footing have been fruitless. There is considerable talk here of the recent attempt to force prices down. As the plan failed, secrecy is being observed by the principals. It was learned, however, that early in November a tonnage of pig tin was sent from New York to London, and offered to consumers at a shade under the ruling quotation. About 150 tons were sold, although it had been freely announced that 1500 tons would be offered. The market did break, but when the American Sheet and Tin-Plate Company began to buy, the price advanced to a point or two above the quotation previously made and continued to advance. It is understood the leading tin-plate producer bought 4000 tons during November.

The scarcity of pig iron is responsible for a stiff advance in prices of steel-making scrap. Dealers have been quoting $20 @21 for heavy melting scrap, but no sales are recorded, as consumers refuse to pay that price. The Sharon Steel Hoop Company last week bought 5000 tons of heavy melting scrap at $19 delivered, which is the highest price paid this year. Sales aggregating 2000 tons had previously been made at $18.50. The United Steel Company, of Canton, O., is in the market for 1500 tons of bundled sheet scrap, and will probably have to pay $17.50 to $18 for it.

Rail buying continues, some roads placing additional orders for next year. The Carnegie Steel Company booked contracts this week aggregating about 40,000 tons of standard sections and 1000 tons of light steel rails. Prices of track material are firm, and premiums are offered for prompt delivery. The price of splice-bars was officially advanced $3 a ton today by the Carnegie Steel Company to $36. Railroad spikes are quoted at $2.50 per 100 lb., but for prompt shipment 25c. additional is asked.

Pig Iron—Active buying for second half has not begun. It is reported that one sale of bessemer was made, and calls for 15,000 tons at $21.25 and 10,000 tons of basic at $21. Buyers are still hesitating and evidently believe prices will be lower later on. There is absolutely no pig iron in large tonnages for delivery before July 1. Offers of $25 for bessemer, and $24.50 for No. 2 foundry, Valley furnaces, for delivery this month, and in the first quarter, are made but without results. Gray forge is quoted nominally at $22, Valley furnaces, but no sales are recorded.

Steel—The steel market is higher, bessemer billets being quoted at $29@30, and open-hearth at $31@32. A few small sales have been made at those prices. Sheet-bars are quoted nominally at $30, but for prompt shipment $1 and $2 more is paid. Tank plates are now quoted at 1.70c., and steel bars are firm at 1.60c.

Sheets—The market is decidedly strong and premiums are paid for early shipment. Prices remain unchanged, black sheets being quoted at 2.60c., and galvanized at 3.65c. for No. 28 gage.

Ferro-Manganese—Prices have advanced and 80 per cent. ferro is quoted at $82 to $83 per ton.

BY TELEGRAPH

Pittsburg, Dec. 5—An advance of $2 per ton in merchant pipe has been ordered, taking effect today.

London Nov. 20

Iron and Steel Exports—The exports of iron and steel and of machinery from Great Britain for the 10 months ended Oct. 31 are valued by the Board of Trade returns as below:

	1905.	1906.	Changes.
Iron and Steel..	£26,207,739	£32,369,712	I. £6,161,973
Machinery.....	19,006,151	21,968,521	I. 2,962,370
New Ships.....	4,786,485	7,943,743	I. 3,157,258
Total.....	£50,000,375	£62,281,976	I. £12,281,601

The total increase was 24.5 per cent. The chief items of the iron and steel exports were, in long tons:

	1905.	1906.	Changes.
Pig iron.....	834,050	1,315,956	I. 481,906
Wrought iron.....	154,162	165,087	I. 10,925
Rails	464,835	393,749	D. 71,086
Plates.....	168,419	218,668	I. 50,249
Steel shapes, etc.....	175,966	216,616	I. 40,650
Sheets.....	333,383	361,766	I. 28,383
Tin-plates.....	300,119	306,459	I. 6,340
All other kinds.....	668,120	814,207	I. 146,087

The total increase in quantities was 693,454 tons, or 22.4 per cent.

Iron and Steel Imports—Imports of iron and steel and of machinery into Great Britain for the 10 months ended Oct. 31 are valued as follows:

	1905.	1906.	Changes.
Iron and steel...	£6,769,775	£7,234,753	I. £464,978
Machinery.....	3,780,011	4,346,874	I. 566,863
Total.....	£10,549,786	£11,581,627	I. £1,031,841

The total increase was 9.8 per cent. The chief items of the iron and steel imports were, in long tons:

	1905.	1906.	Changes.
Pig iron.....	97,257	72,388	D. 24,869
Wrought iron.....	77,440	92,083	I. 14,643
Steel billets, etc.....	472,014	432,502	D. 39,512
Bars and shapes.....	40,571	51,673	I. 11,102
Structural steel.....	98,327	125,263	I. 26,936
All other kinds.....	279,821	292,537	I. 12,716

The total increase in quantities this year was 1016 tons, or 0.1 per cent.

Iron Ore Imports—Imports of iron ore into Great Britain for the 10 months ending Oct. 31 were as follows, in long tons:

	1905.	1906.	Changes.
Manganiferous ores.	238,450	271,583	I. 33,133
Iron ores	5,837,818	6,429,514	I. 591,696
Total.....	6,076,268	6,701,097	I. 624,829

Of the imports this year 168,043 tons of manganiferous ores and 4,864,878 tons of iron ore were from Spain.

Cartagena, Spain Nov. 10

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for the week were two cargoes, 3130 tons manganiferous and one cargo, 2300 tons iron ore, to Great Britain; one cargo, 3000 tons manganiferous ore, to Rotterdam; one cargo, 2900 tons dry ore, to Sydney, Cape Breton. Freight rates are easier.

Quotations for iron ores, f.o.b. shipping port, are: Ordinary 50 per cent. ore 9s. 4d.@9s. 7d.; special low phosphorus, 9s. 10d.@10s. 1d.; specular ore, 58 per cent. iron, 12s. 7d.; S. P. Campanil, 11s. 3d. Manganiferous ore, No. 3 grade, 35 per cent. iron and 12 manganese, is 14s.; no higher grades on the market.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, are 11s. per ton, f.o.b. shipping port.

Dusseldorf, Germany Nov. 15

Exports of iron and steel from Germany for the nine months ending Sept. 30 were as follows, in metric tons:

	1905.	1906.	Changes.
Iron and steel	2,342,495	2,728,729	I. 386,234
Machinery	220,189	211,913	D. 8,276
Total	2,562,684	2,940,642	I. 377,958

The net increase was 14.7 per cent. Imports for the nine months were as follows:

	1905.	1906.	Changes.
Iron and steel	235,165	443,795	I. 208,630
Machinery	60,715	65,075	I. 4,360
Total	295,880	508,870	I. 212,990

The increase this year was large, 72 per cent. It was chiefly in billets, blooms and other half-finished forms.

Brussels, Belgium Nov. 26

The Belgian blast furnaces made an output of 127,500 tons of pig iron in October, an increase of 9200 tons over last year. For the 10 months ending Oct. 31 the output was, in metric tons:

	1905.	1906.	Changes.
Foundry	84,930	84,690	D. 240
Forge	181,370	191,540	I. 10,170
Bessemer and basic	854,170	903,260	I. 49,090
Total	1,120,470	1,179,490	I. 59,020

On Nov. 1 there were 42 blast furnaces in Belgium, of which 37 were in blast and 5 under repair. Three new furnaces, of large size, are under construction.

Chemicals

NEW YORK, Dec. 5

Copper Sulphate—The market remains strong and steady, but with no change in prices. Quotations remain $7 per 100 lb. for carload lots, and $7.25 for smaller parcels.

Nitrate of Soda—There is no change in conditions affecting this market. Spot is quoted at $2.62½ per 100 lb., and an advance is expected, demand being strong.

Sulphur—The exports of sulphur from Sicily for September, and the nine months ending Sept. 30 were as follows, in the tons of 1030 kg., which are the customary measure in the brimstone trade:

	1905.	1906.	Changes.
Exports Sept.	27,522	15,755	D. 11,767
" nine months.	366,145	328,604	D. 37,541
Stocks, Oct. 1	409,884	466,806	I. 56,922

The shipments to the United States in September, 1905, were 3417 tons; in 1906 only 21 tons.

Metal Market

NEW YORK, Dec. 5.

Gold and Silver Exports and Imports.

At all United States Ports in October and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Oct. 1906	$7,051,350	$27,224,313	Imp. $20,172,963
" 1905	310,696	10,722,132	" 10,411,436
Year 1906	42,842,312	139,000,330	" 96,158,018
" 1905	42,988,617	41,061,734	Exp. 1,926,883
Silver:			
Oct. 1906	3,557,560	3,816,293	Imp. 258,733
" 1905	4,511,924	2,432,553	Exp. 2,079,371
Year 1906	48,998,899	36,810,362	" 12,188,537
" 1905	43,955,134	26,939,551	" 17,015,583

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.

For week ending Dec. 1 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$ 2,500	$ 32,431	$ 537,600	$ 259,382
1906	6,050,234	92,852,298	47,426,561	2,282,255
1905	34,604,003	10,564,732	31,822,482	3,929,326
1904	100,906,489	6 599,623	33,727,810	1,132,615

The gold exported for the week went to Hayti; the silver to London. Imports of gold for the week were from the West Indies; of silver from Mexico.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Dec. 1 gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts	$1,023,882,300	$1,048,552,300
Deposits	1,007,172,500	998,634,700
Circulation	54,066,500	53,324,400
Specie	179,843,400	181,687,100
Legal tenders	74,515,100	69,420,700
Total reserve	$254,358,500	$251,107,800
Legal requirements	251,793,125	249,659,675
Surplus	$ 2,565,375	$ 1,449,125

Changes for the week this year were increases of $5,084,000 in loans, $1,059,000 in circulation, $669,600 in deposits, and $542,200 in legal tenders; decreases of $3,329,100 in specie and $2,954,300 in surplus reserve.

Shipments of silver from London to the East are reported by Pixley & Abell as follows, for the year to Nov. 22:

	1905.	1906.	Changes.
India	£5,674,721	£ 14,173,296	I. £ 8,498,575
China	814,246	430,700	D. 383,546
Straits	38,299	1,750	D. 36,549
Total	£ 6 527,266	£ 14,605,746	I. £ 8,078,480

Imports for the week were £2000 from Chile and £110,000 from New York; £112,000 in all. Exports were £177,000 in bars and £56,000 in Mexican dollars; a total of £233,000, all to India.

Indian exchange has hardened, owing to active trade in that country. The Council bills offered in London were taken at an average of 16.06d. per rupee. Silver shipments to India have been light.

The Treasury Department's estimate of the amount and kinds of money in the United States on Dec. 1 is as follows:

	In Treasury.	In Circul'n.
Gold coin (inc bullion in Treasury)	$ 262,864,621	$ 685,974,422
Gold certificates	55,087,780	572,972,119
Silver dollars	9,611	84,211,919
Silver certificates	7,084,417	470,118,583
Subsidiary silver	3,893,072	122,261,710
Treasury notes of 1890	15,424	6,811,576
U. S. notes	3,420,694	343,260,322
Nat. Bank notes	9,916,945	583,463,604
Total	$ 342,292,534	$2,869,074,255

Population of the United States, Dec. 1, 1906, estimated at 85,249,000; circulation per capita $33.66. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the Government. The statement of money held in the Treasury assets of the Government does not include deposits of public money in national bank depositories to the credit of the Treasurer of the United States, amounting to $134,397,227. The amount in circulation on Dec. 1 was $2,191,469 more than on Nov. 1, and $206,939,716 more than on Dec. 1 last year.

The German Imperial mint reports for the third quarter of 1906 total coinage as follows, in face value: Gold, 31,326,900 marks; silver, 18,923,000 marks; nickel, 1,628,700 marks; copper 182,600 marks.

The following table shows the specie holding, in dollars, of the leading banks of the world:

	Gold.	Silver.	Total.
New York	.....	.....	$212,561,100
England	$166,315,720	.....	166,315,720
France	551,347,055	$201,816,650	757,163,705
Germany	151,735,000	50,580,000	202,315,000
Spain	76,705,000	121,310,000	198,015,000
Netherlands	27,657,500	28,216,000	55,873,500
Belgium	16,133,355	8,066,655	24 200,000
Italy	158 835,000	21,630,000	180,465,000
Russia	570,275,000	21,305,000	591,580,000
Austria	234,720,000	59,120,000	293,840,000
Sweden	19,810,000	.....	19,810 000

The returns of the associated banks of New York are of date Dec. 1, and the others Nov. 30. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Prices of Foreign Coins

	Bid.	Asked
Mexican dollars	$0.52½	$0.55
Peruvian soles and Chilean	0.47¾	0.49
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.87	3.91
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

Nov.-Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
29	.....	....	32¾	3	4.85	68½	31½
30	4.85½	69¾	32	4	4 85	69½	31⅛
1	4.85	69¾	32¼	5	4.85	68¾	31½

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals

Daily Prices of Metals in New York.

Nov.-Dec.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
29	.....	.....	102¼	....	....	.....	.....
30	22⅝ @22¾	22 @22¼	102⅛	43 @43¼	5.75	6.40 @6.45	6.25 @6.30
1	22⅝ @22¾	22⅛ @22⅜	.....	43	5.75	6.45 @6.50	6 30 @6.35
3	22¾ @23	22⅛ @22⅜	102 11/16	43¼	5.75	6.45 @6.50	6.30 @6.35
4	22¾ @23	22⅛ @22⅜	103 1/16	42¾	5.75	6.45 @6.50	6 30 @6.35
5	22¾ @23	22⅛ @22¼	102⅝	42½	5.75	6.45 @6.50	6.30 @6.35

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions as made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotation on spelter are for ordinary western brands; special brands command a premium.

Copper—A fair amount of business is reported both for domestic and foreign consumption. Transactions, however, are not large owing to the scarcity of supplies, which remains the dominant influence in the market. Quotations at the close are firm and higher at 22¾@23c. for Lake copper; 22⅛@22⅜ for electrolytic in ingots, cakes and wirebars. The average for casting copper for the week is 22 cents.

Standard prices in London have been strong throughout the week, although there has been a slight reaction from the highest prices reached, the close being cabled as £102 12s. 6d. for spot, £103 15s. for three months.

Statistics for the second half of November show an increase in the visible supplies of 800 tons.

Refined and manufactured sorts we quote: English tough, £103@104; best selected, £107@108; strong sheets, £109 @110.

Copper Exports and Imports—The exports of copper from the United States for the 10 months ending Oct. 31 are reported as below by the Bureau of Statistics of the Department of Commerce and Labor, in long tons:

	1905.	1906.	Changes.
Great Britain	23,109	19,700	D. 3,409
Belgium	1,839	1,841	I. 2
France	27,313	29,782	I. 2,469
Italy	5,824	7,027	I. 1,203
Germany and Holland	88,107	96,450	I. 8,343
Russia	7,726	3,136	D. 4,590
Other Europe	9,414	9,629	I. 215
Canada	1,083	1,611	I. 528
China	34,487	2,002	D. 32,485
Other countries	7,194	194	D. 7,000
Total metal	206,096	171,372	D. 34,724
In ores and matte	4,954	4,799	D. 155
Total	211,050	176,171	D. 34,879

The total decrease was 16.5 per cent. If, however, we omit the exports to China in both years, the decrease remaining is only 2394 tons, or 1.3 per cent. The actual quantities of ore and matte exported were 30,492 tons in 1905, and 37,823 tons in 1906; contents are estimated chiefly on the basis of values. Of the ore and matte exported this year 27,999 tons went to Canada, 9570 tons to Mexico, and 254 tons to other countries.

Imports into the United States of copper and copper material for 10 months ending Oct. 31, with re-exports of foreign metal, are reported as follows; the figures give the contents of all material in long tons of fine copper:

	Metal.	In ore, etc.	Total.
Mexico	32,566	12,182	44,748
Canada	12,060	4,081	16,141
Great Britain	7,866	.....	7,866
Japan	2,210	.....	2,210
South America	.....	1,854	1,854
Other countries	10,416	847	11,263
Total imports	65,118	18,964	84,082
Re-exports	499	88	587
Net imports	64,619	18,876	83,495
Net imports, 1905	58,422	18,150	76,572

The total increase in the net imports this year was 6923 tons, or 9 per cent. The actual tonnage of ores and matte from Mexico this year was 87,035; from Canada and Newfoundland, 54,885; from South America, 7786 tons.

The excess of exports over net imports was 92,676 tons in 1905, and 134,478 tons in 1906; a decrease of 41,802 tons this year.

Tin—Domestic buyers refuse to follow the lead of the London speculators who have time and again tried to awaken interest in the bull side of the market. There are reports that some of our consumers who have a surplus supply have taken advantage of the high prices established in London by selling in that market, which, on this account, closes easy at £194 for spot, £195 10s. for three months.

In this market the closing quotation is 42½c.

Statistics for the month of November show a decrease in the visible supplies of 100 tons.

Imports of tin into the United States for the 10 months ending Oct. 31 were as follows, in long tons, of 2240 lb. each:

	1905.	1906.	Changes.
Straits	16,877	12,420	D. 4,457
Australia	484	859	I. 375
Great Britain	15,937	21,779	I. 5,842
Holland	379	443	I. 64
Other Europe	677	1,301	I. 624
Other countries	42	240	I. 198
Total	34,396	37,042	I. 2,646

The total increase this year over 1905 was 7.7 per cent.

Stocks of tin reported on Dec. 1 were as follows, in long tons:

	Store.	Afloat.	Total.
London	1,336	3,849	5,185
Holland	1,847	183	2,030
United States	1,210	3,970	5,180
Total	4,393	8,002	12,395

United States stocks do not include Pacific ports.

Lead—A heavy consumption is going on in all lines. The price is unchanged, 5.75c. New York.

The London market has fluctuated within narrow limits, but on the whole the position has improved there and the close is steady at £19 8s. 9d. for Spanish lead, £19 11s. 3d. for English lead.

Imports of lead in all forms into the United States for the 10 months ending Oct. 31, with re-exports of foreign metal, were as follows, in short tons:

	1905.	1906.	Changes.
Lead, metallic	3,503	11,256	I. 7,753
Lead in ores and base bullion	80,059	61,900	D. 18,159
Total imports	83,562	73,156	D. 10,406
Re-exports	52,112	40,088	D. 12,024
Net imports	31,450	33,068	I. 1,618

Of the lead imported this year 57,686 tons were from Mexico, and 6531 tons from Canada. There were 7894 tons imported from Europe. Exports of domestic lead were 239 tons in 1905 and 255 tons in 1906; an increase of 16 tons.

St. Louis Lead Market—The John Wahl Commission Company telegraphs us on Dec. 5 as follows: Lead is firm at 5.85@5.95c. for Missouri brands, East St. Louis.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Nov. 17, that the price of lead has been 89.25 reales per quintal, silver being paid for at 14.50 reales per quintal. Exchange 27.76 pesetas to £1. The price of lead, on current exchange, is equal to £18 per long ton, f.o.b. Cartagena. Exports for the week were 200 tons desilverized to Venice; 300 tons desilverized to Antwerp; 66 tons desilverized to Marseilles; 575 tons desilverized and 507 tons argentiferous lead to Great Britain; a total of 1648 tons.

Spelter—The good demand from galvanizers and brass manufacturers has resulted in a further advance in prices, which close firm at 6.45@6.50 New York, 6.30@6.35 St. Louis.

The London market has offered nothing new during the week and closes at £27 17s. 6d. for good ordinaries, £28 2s. 6d. for specials.

Exports of spelter from the United States for the 10 months ending Oct. 31 were 2727 short tons in 1905, and 4049 tons in 1906; an increase of 1322 tons. Exports of zinc ore were 21,847 tons in 1905, and 22,730 tons in 1906; an increase of 883 tons. Exports of zinc dross were 12,249 short tons in 1906; this article was not reported separately last year.

Imports of spelter were 509 short tons in 1905, and 2168 tons in 1906; an increase of 1659 tons.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Nov. 17, that shipments for the week were 1000 tons blende to Swansea; 2100 tons blende and calamine to Antwerp. The market is quiet, and shipments are all on old contracts.

Zinc Sheets—The price of zinc sheets is $8 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The base price for sheet zinc has varied little this year; the highest was $8 on Jan. 6, the lowest $7.65 on May 18; it is now again at the highest point.

Antimony—The market is altogether nominal at last quotations, viz.: 24½@25c. for ordinary brands, 25@25½c. for Hallett's and 26@26½c. for Cookson's.

Imports of antimony into the United States for the 10 months ending Oct. 31 are reported as below, in pounds:

	1905.	1906.	Changes.
Metal and regulus.	4,599,336	5,766,652	I. 1,167,316
Antimony ore.....	1,625,618	1,588,281	D. 37,337

There was an increase of 25.4 per cent. in metal and regulus, but a decrease of 2.3 per cent. in ore.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 45@50c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Imports of nickel ore and matte into the United States for the 10 months ending Oct. 31 were 11,313 tons in 1905, and 13,521 tons in 1906; an increase of 2208 tons. Exports of nickel, nickel oxide and nickel alloy were 8,262,169 lb. in 1905, and 9,123,996 lb. in 1906; an increase of 861,927 lb. this year.

Platinum — Demand continues strong. Unmanufactured platinum is quoted at $38 per oz., while $30@31.50 is paid for good scrap. A further advance is probable.

Imports of platinum into the United States for the 10 months ending Oct. 31 were 5937 lb. in 1905, and 9829 lb. in 1906; an increase of 3892 lb. this year.

Quicksilver—This metal remains steady, with no material changes. The New York quotation is $40.50@42 per flask of 75 lb., according to size and conditions of order. San Francisco quotations are $39@40 per flask for home orders, and $37@38 for export. The London price is £7 per flask, with £6 18s. 9d. named by jobbers.

Exports of quicksilver from the United States for the 10 months ending Oct. 31 were 869,552 lb. in 1905, and 429,467 lb. in 1906; a decrease of 440,085 lb. this year.

Aluminum — The chief producer gives list prices for ton lots and over as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. up, according to size.

Exports of aluminum from the United States for the 10 months ending Oct. 31 were valued at $245,366 in 1905, and $283,542 in 1906; an increase of $38,176 this year.

Missouri Ore Market

JOPLIN, Dec. 1

The highest price reported paid for zinc was $49 per ton, on an assay basis of $44.50@47 per ton of 60 per cent. zinc. Average price, all grades, $44.44.

The highest price paid for lead was $85.50 per ton, medium grades selling at $80@84, and the average price $82.78.

The lowest assay price was for zinc $44.50, against $43 the previous week, and more ore sold at a higher assay price, indicating a stiff demand. The output was limited on account of Thanksgiving and wet weather, the former having most to do with the decrease, however. Producers have been so prosperous this year that they took more time to observe their thankfulness, laying aside the usual push for a greater enjoyment of the blessings that have been bestowed upon them.

The smelters have thousands of tons of ore purchased, which is lying in open bins at the mines, the shortage of cars being even more pronounced than for several weeks past.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Vale.
Joplin	2,696,760	314,150	$75,056
Webb City-Carterville	1 863,040	562,050	65,192
Galena-Empire	742,450	102,970	20,607
Duenweg	733,720	33,200	17,885
Prosperity	376,510	180,920	15,979
Alba	651,080	.....	15,300
Badger	589 600	.....	14,140
Neck City	558 090	.....	13,114
Aurora	451 270	.....	8,084
Spurgeon	248,490	54,210	6,828
Granby	332 000	43,000	6,200
Oronogo	170,130	18,960	4,758
Cave Springs	111,090	.....	2,444
Stott City	65 320	.....	1,502
Carthage	54 300	.....	1,275
Wentworth	48,100	.....	1,106
Totals	9,683,950	1,309,460	$269,470
48 weeks	513,550,810	71,780,800	$13,891,189
Zinc value, the week, $215 261: 48 weeks,			$11,112,887
Lead value, the week, 54,209: 48 weeks,			2,778,302

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58.00	75.13
May	43.31	40.51	May	58.27	78.40
June	40.75	43.83	June	57.80	80.96
July	43.00	43.25	July	58.00	74.31
August	48.83	43.56	August	58.00	75.36
September	46.75	42.58	September	63.50	79.64
October	47.60	41.55	October	63.86	79.84
November	49.55	44.13	November	68.67	81.98
December	49.00	....	December	76.25	....

Wisconsin Ore Market

PLATTEVILLE, Dec. 1

The week's buying has not been characterized by anything unusual; the prices of last week were for the most part maintained. It is reported that Ross Bros., of Linden camp, are negotiating with foreign interests for the sale of their ore. According to well informed sources there will be a continuance of the present conditions; no cut is reported and cold weather is beginning to come on, meaning a curtailment of the output to a certain degree. The buyers seem to be desirous of loading all the ore possible and the visible supply is comparatively small, although there is a large supply at the local zinc works.

The different camps of the district loaded ore for the week ending Dec. 1, as follows:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur Lb.
Platteville	501,220	.....	.....
Galena	311,770	.....	.....
Benton	178,200	.....	.....
Linden	175,360	.....	.....
Highland	130,100	.....	.....
Cuba City	122,200	.....	.....
Rewey	124,000	.....	.....
Dodgeville	105,000	.....	.....
Mineral Point	84,260	.....	.....
Buncombe & Hazel Green	65,000	50,000	.....
Total for week	1,797,110	50,000	.....
Year to Dec. 1	71,610,376	3,345,130	4,053,910

Up to the present writing there has been little improvement in the car situation. In spite of this fact and the extremely bad condition of the roads the tonnage loaded was quite good.

Mining Stocks

NEW YORK, Dec. 5

Interest has centered on the curb market this week, and especially on the erratic course of Nipissing. That stock began to break early in the week on rumors of trouble in relation to the title, and went down with a rush when it was announced that the Guggenheim option on a large block of the shares had been forfeited. From $34 the stock fell rapidly, closing at $16. An official denial of any trouble in relation to the titles to the property failed to stay the break. Sales were very heavy, over 100,000 shares changing hands in one day. This break affected nearly all the mining stocks, and there was general weakness though the losses on other stocks were small. In fact attention was so directed to the star performer that other stocks were neglected, and their weakness was as much from that cause as from any other. Some account of the transactions chiefly causing the fall will be found on another page.

The general stock market was rather uncertain, with a tendency to weakness. Amalgamated Copper closed at $114; American Smelting common at $154, both showing slight losses.

There was one sale of Homestake during the week, at $82.50 per share, a loss from the last quotation.

Boston Dec. 4

Still more records have been made in the prices of some mining shares the past week and it has been a broad and active market for these stocks. The Lake issues have come into prominence, which is pleasing, as it reminds one of the old days when these securities were the prime favorites. The Nipissing affair, although unfortunate to a few, may prove a blessing as it will curb the wild speculation that has been seen in some of the stocks traded in on the outside. Calumet & Arizona made a $22 jump, touching $184 today, but the close found it $10 below the high, which is its best price. Rich strikes at the mine brought buying orders in a market which had little stock offering. Wolverine also made a new high record, touching $172.50. The final today was $170, or $10 above the price a week ago.

Allouez touched $49.25, but closed $1 below last week at $47.50, and Centennial closes with a slight net loss at $31.50. Arcadian advanced $2.25 to $13.50, but reacted $1. Copper Range closes at $81, or $3.37½ below its high point, and Franklin $1.62½ lower at $22. Isle Royale rose $1.12½ to $26, but is now off to $24. Michigan rose $1 to $19, reacting fractionally, and Osceola, which rose $2.50 to $137.75, fell back to $135. Quincy rose $1.50 to $109, and Tecumseh sold up $3.75 to $21.50, reacting to $20. Winona touched $12 and Wyandot has been active, touching $2.37½.

Persistent buying of Greene Consolidated has caused the stock to advance $2 to $28.12½, although the close was $27, tonight. Old Dominion has been heavy, and although there have not been any offerings to amount to anything the price is off $1.75 net to $55.75. Utah spurted $2.75 to $66, but lost most of it and U. S. Smelting closes a trifle above a week back, at $62.75. Victoria touched $7.75, but reacted over $1. North Butte has held well. It sold up $2 to $114, but reacted to $112 today. Butte Coalition moved up $1.62½, with subsequent reaction. Nevada Consolidated has lost over $2 during the week, closing at $17.50.

Amalgamated advanced steadily, touching $114.62½, with the final today over $1 above last week, at $113.62½. Mohawk holds at close to its best, $75 per share. Parrot spurted $2.25 to $30.75, although it closed tonight at $29. Tamarack rose $6 to $111. The resignation of Director Meserve from the Adventure and Rhode Island companies had but a momentary effect on these stocks, even though he disposed of his holdings in the market. The Champion paid another $1 dividend last week, making a total of $10 paid this year. St. Mary's Mineral Land sold at $75 today. This company has declared a regular quarterly dividend of $1 per share.

Cananea was the curb feature, spurting up over $11 to $40.12½, although part of the gain was lost today. The Greene Consolidated benefits by this advance as it owns 200,000 of the 600,000 shares out at a cost of $10 per share.

Los Angeles, Cal. Nov. 28

A Mining Chamber is the most recent project of that enterprising city. The object is to make Los Angeles more of a mining center than it at present is. The machinery men are to be urged to keep stocks on hand for immediate shipment instead of acting merely as brokers to take orders for future shipments. It is intended also, according to the plans, to arrange so that prospectors, miners, investors and promoters may be able to hypothecate their securities in that city. To do this it will be necessary to influence the local banks to recognize mining securities. The Chamber also proposes to protect stock buyers by registering properties which have been investigated by its experts as to title, management, etc. The latter feature is a pretty big contract, which is theoretically a fine thing, but practically, so far, has always been a failure. The Chamber proposes to charge the applicant for registration and the experts' investigation. This being the case, he might as well employ his own expert and get the information for himself alone. Generally speaking, however, ordinary mining-stock buyers never have any properties experted and it is hardly to be expected that they will apply to a Chamber for such information and pay for a special report accessible to other members who pay nothing. A committee on permanent organization has been appointed.

San Francisco Nov. 29

The activity in the mining-stock market continues. After a brief recession, due largely to profit-taking, the Comstocks were stronger. For the southern Nevada stocks buying continues strong and the market rather excited. A number of new stocks have been listed.

Mexico Dec. 1

Mining shares during the past week were rather unactive, except in the case of Amistad y Concordia and Santa Gertrudis y Guadalupe, in which there was quite a flurry because of a meeting of the large holders of both companies to discuss the advisability of merging the two; this caused the stock of the former to jump from $86 up to $115, and the latter from $115 to $140. Of the other stocks the sales were reported as follows: Santa Maria de La Luz, San Luis Potosi, $230; Petlanque, Guerrero, $9.50, and Juliantla, Guerrero, $95; Roma, Guanajuato, $30; Norias de Bajau, Nuevo Leon, $1105; Sorpresa, Hidalgo, $525. In El Oro district sales were: Borda Antigua, $83; Aldebaran, $140; Mexican Mines of El Oro, $30; Oro Nolan, $740; Dos Estrellas, $8000 per share.

Monthly Average Prices of Metals

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	64.765	26.108	29.984
May	57.832	66.976	26.664	30.968
June	58.428	65.394	26.910	30.185
July	58.915	65.105	27.163	30.113
August	60.259	65.949	27.822	30.529
September	61.695	67.927	28.528	31.483
October	62.034	69.523	28.637	32.148
November	63.849	70.813	29.493	32.671
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, 0.925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.419	68.262	78.869
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March.	15.125	18.361	15.250	18.641	68.174	81.111
April.	14.920	18.375	15.045	18.688	67.017	84.793
May.	14.627	18.457	14.820	18.724	64.875	84.867
June.	14.673	18.442	14.813	18.719	65.881	83 994
July.	14.888	18.190	15.005	18.585	66.887	81.167
Aug.	15.664	18.380	15.725	18.706	69.830	83.864
Sept.	15.965	19.033	15.978	19.328	69.667	87.831
Oct.	16.279	21.203	16.332	21.722	71.406	97.269
Nov.	16.599	21.833	16.758	22.398	74.727	100.270
Dec.	18.328	.....	18.398	.....	78.993	.....
Year.	15.590	.....	15.699	.....	69.465	....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	29.325	36.390	July	31.760	37.275
Feb.	29.262	36.403	August	32.866	40.606
March.	29.523	36.662	Sept	32.095	40.516
April	30.525	38.900	Oct	32.481	42.852
May.	30.049	43.313	Nov.	33.443	42.906
June.	30.329	39.260	Dec.	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	4.552	5.600	July	4.524	5.750
Feb.	4.450	5.464	Aug.	4.665	5.750
March.	4.470	5.350	Sept.	4.850	5.750
April.	4.500	5.404	Oct.	4.850	5.750
May.	4.500	5.685	Nov.	5.200	5.750
June.	4.500	5.750	Dec.	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £16.850 per long ton; February, £16.031; March, £15.922; April, £15.959; May, £16.725; June, £16.813; July, £16.525; August, £17.109; September, £18.266; October, £19.350; November, £19.281.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	6.032	6.337	25.062	28.225
Feb.	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April.	5.817	6.078	5.667	5.931	23.813	25.781
May.	5.434	5.997	5.284	5.846	23.594	27.000
June.	5.190	6.096	5.040	5.948	23.875	27.728
July.	5.396	6.006	5.247	5.856	23.938	26.800
Aug.	5.706	6.027	5.556	5.878	24.675	26.938
Sept.	5.887	6.216	5.737	6.056	26.375	27.563
Oct.	6.087	6.222	5.934	6.070	28.225	28 075
Nov.	6.145	6.375	5.984	6.225	28.500	27.781
Dec.	6.522	.....	6.374	...	28.719	.....
Year.	5.822	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2240 lb.) good ordinary brands.

STOCK QUOTATIONS

NEW YORK. Week Dec. 1.

Name of Company.	High.	Low.	Clg	Sales.
Alaska Mine	2⅛	1⅞	2	5 200
Am. Nev. M. & P. Co.	3⅜	3	3⅜	1,200
Amalgamated*	113	111¾	112	4,568
Anaconda	281½	276	281½	49,840
Balakala	11½	11⅜	11¼	200
British Col. Copper	13⅞	13	13⅛	17,500
Buffalo Cobalt	4⅝	4⅛	4¼	4,700
Butte of London	....	....	2¾	
Butte Coalition	36⅜	36	36⅜	265
Butte Copper & Zinc	7	6⅝	6⅞	12 100
Cobalt Contact	⅞	⅞	⅞	2.900
Colonial Silver	5¼	4⅞	4⅞	22,500
Cum. Ely Mining	13¼	12	12¼	7,150
Davis Daly	13½	12⅜	13½	1,710
Dominion Cop	5⅛	5	5	1 660
El Rayo	7	6¼	6⅞	3,300
Foster Cobalt	3⅞	3½	3½	9.000
Furnace Creek	3⅞	3¼	3¼	3,900
Giroux Mine	10½	10	10	1.450
Gold Hill	6⅝	5¼	6	13.700
Greene Gold	....	....	2	
Greene Gold & Silver	2	1¾	2	5,250
Greenwater & D. Val	3	3	3	300
Guanajuato	4⅞	4¾	4⅝	1,935
Guggen. Exp	317	295	300	116
Hanapah	7/16	7/16	7/16	1.000
McKinley Darragh	3½	2¾	2¾	14.600
Micmac	6¼	6¼	6¼	11.605
Mines Co. of Am'	2¾	2⅝	2⅝	73 000
Mitchell Mining	5½	5	5⅛	6,460
Mont. Sho. Con. (New)	16⅛	14	15	1,400
Nev. Utah M. & S	4¼	4	4⅛	3 500
Newhouse M. & S	17⅜	15	18¼	25,500
Nipissing Mines	27⅛	22⅝	19⅜	192.500
Old Hundred	4⅜	4¼	4⅜	14,800
Richmond Eureka	7⅜	7⅜	7⅜	
Silver Queen	2 7/8	2⅝	2⅜	17.500
Stewart	2⅜	1⅝	2	5,700
Tennessee Copper	49	47⅛	48⅞	6,500
Union Copper	1 3/16	1	1⅛	4,800
Utah Apex	7	7	7	100
West Columbus	24	22	24	11 000

NEW YORK INDUSTRIALS.

Am. Agri. Chem	26	25⅛	25⅛	700
Am. Smelting & Ref	155⅜	151⅛	152	89,300
Am. Smelt. & Ref., Pf.	116⅛	115¼	115⅞	1,855
Bethlehem Steel	21	20	20	700
Colo. Fuel & Iron	55½	54	55	20,300
Federal M. & S., Pf*	99¾	98	98	3.400
Inter. Salt*	30¾	30	26½	3,860
National Lead	77	75¼	75⅛	2,700
National Lead, Pf	102¾	102½	102½	200
Pittsburg Coal	17⅜	17	17¼	2,100
Republic I. & S	38¼	37	38	8,840
Republic I. & S., Pf	101½	101	101	2,075
Sloss-Sheffield	76½	75	76	2,100
Standard Oil	530	522	525	383
Tenn. C. & I	166	160	164	4,600
U. S. Red. & Ref	30	27½	29¾	
U. S. Steel	48	47	48	98 910
U. S. Steel, Pf	105	104½	105	10.425
Va. Car. Chem	42½	37⅛	41	12,500
Va. I. Coal & Coke	80¾	73	80¾	10,600

PHILADELPHIA Dec. 1

Name of Company.	High.	Low.	Clg.	Sales.
American Cement	10⅜	9¾	9¾	1,559
Cambria Steel	39¼	37⅝	39⅛	10,125
General Asphalt	7	7	7	
Penn. Steel. pd	105	105	105	
Philadelphia Co.	48½	48	48	15
Tonopah Mining	20½	20¼	20¼	2,590

PITTSBURG Dec. 1

Crucible Steel	13	12⅛	12⅛	570
Crucible Steel, Pf	81	80¾	80¾	335
Harbison-Walker Ref.	13⅞	13½	13½	358
Ohio Tonopah	.28	.27	.27	850
Tonopah Ext	6⅞	6¼	6½	2,870

St. Louis Dec. 1.

Adams, $0.40—$0.25; American Nettie, $0.08—$0.06; Center Creek, $2.60—$2.20; Central Coal and Coke, $64.50—$63.75; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$55.00; Columbia, $4.00—$3.90; Con. Coal, $24.00—$22.50; Doe Run, $145.00—$140.00; Granite Bimetallic, $0.24—$0.22; St. Joe, $19.00—$18.00.

COLORADO SPRINGS Dec. 1

Name of Company.	High	Low	Clg	Sales
Acacia	13	12½	13	9,000
C. C. Con	7¼	6⅞	7	
Dante	7	6½	6½	49,000
Doctor Jack Pot	8¾	8	8¼	26,000
Elkton	59	55½	59	25 800
El Paso	58	56	57½	8,600
Findley	68½	67	67	10,500
Gold Dollar	8½	8¼	8½	17,350
Gold Sovereign	6½	6⅜	6½	21,000
Isabella	29	23	27¼	30,000
Jennie Sample	9⅛	9	9¼	
Mary McKinney	70½	70	70	11,000
Pharmacist	6½	6⅜	6⅜	
Portland	1.45	1.40	1.44	2,300
Vindicator	95	94	94	
Work	24⅝	22¾	24⅝	29.000

BOSTON Dec. 1

Adventure†	5	4¾	4⅞	4,719
Allouez	49¼	45	48	24,480
Am. Zinc	34	30	34	500
Arcadian	13½	11⅝	12⅜	15 806
Atlantic	15½	14	15	2,945
Bingham	33⅛	31⅛	32½	3,275
Boston Consolidated	33⅛	31½	32½	3,565
Calumet & Arizona	170	160½	169	3,320
Calumet & Hecla*	860	855	855	15
Centennial	38¾	35⅜	38¾	13,696
Con. Mercur*	.53	.49	.49	4,300
Copper Range	84⅜	83	84	9,979
Daly-West	21	20	20½	1,183
Franklin	23⅛	21⅝	23¼	7.612
Granby	13⅛	12	13⅜	2,121
Greene Consolidated*	26½	25⅞	26¼	9,982
Isle Royal	26	23¾	24½	8,775
Mass	8¾	7⅞	8¾	1,362
Michigan	20	17¾	19¾	11,461
Mohawk	75	72¼	75	4,015
Mont. Coal & Coke new	2½	1¾	2¼	9,250
Nevada	19¾	18½	18½	2,545
North Butte	112	111¾	111½	3,889
Old Colony	2	1¾	1¾	1,425
Old Dominion	58⅝	56¾	56½	4.359
Osceola	138	133¼	137	6 136
Parrot*	30¾	26	29¾	10,720
Phoenix	1¼	1	1¼	550
Quincy	109	104	109	1,734
Rhode Island	7⅜	5¾	7	19,979
Santa Fe	5	4¾	4⅞	4,805
Shannon	18⅞	17¾	18⅜	20.522
Tamarack	113	101	110	1,407
Tecumseh	21	17⅛	21	13,986
Trinity	11⅛	11	11⅛	1,610
United Copper, com	75¾	74⅞	75¾	1,520
U. S. Oil	10	9⅜	10	725
U. S. Smg. & Ref	63¾	61⅛	63½	3,054
U. S. Smg. & Ref., pfd.	46	45¼	46	3,892
Utah Copper	66	63	65	5,000
Victoria	7⅜	6¼	7¼	5,409
Washington	2¼	2⅛	2¼	100
Winona†	11⅜	10¾	11¼	1,320
Wolverine	161	160	161	391
Wyandotte	2¾	1	2¼	3.585

*Ex. Div. †Ex. Rights.

BOSTON CURB.

Abitibi & Cobalt	.35	.28	.33	25,270
Ahmeek	100	100	100	30
Ariz. Com'l	37	36½	36¾	775
Black Mt	9¾	9	9⅛	405
Cananea Cent	35½	28¾	34½	11,229
East Butte	11½	11	11¼	3 065
Hancock Con	16½	13	16	2,230
Keweenaw	11⅞	11⅜	11⅜	2,235
Majestic	4⅛	3¾	3½	3,785
Raven	1.87½	.82	1.12½	29.039
Shawmut	.99	.80	.85	1,550
Superior	25	19	22	1,495
Superior & Pitts	27⅛	26	27	10,883
Troy	4	3 7/16	3⅜	4,050

NEVADA MINING STOCKS. Dec. 5.

(Revised by Weir Bros. & Co., New York)

TONOPAH STOCKS.	High.	Low.	Last.
Tonopah Mine of Nevada	20.75	20.00	20.00
Tonopah Extension	6.50	6.25	6.37½
Montana Tonopah	3.75	3.70	3.70
Belmont	6.50	6.37½	6.37½
Tonopah Midway	2.60	2.55	2.57
West End Con	2.35	2.30	2.30
Jim Butler	1.45	1.44	1.45
GOLDFIELD STOCKS.			
Sandstorm	.85	.82	.83
Kendall	.65	.62	.64
Red Top	4.00	3.87½	3.87½
Jumbo	4.00	4.00	4.00
Goldfield Mining	2.00	1.95	1.95
Diamondfield B. B. Con	.63	.61	.62
Atlanta	.82	.79	.80
Mohawk	15.00	15.00	15.00
Silver Pick	1.90	1.88	1.88
Laguna	1.90	1.85	1.85
BULLFROG STOCKS.			
Montgomery Shoshone Con.	15.00	13.50	14.00
Tramps Con	2.00	2.00	2.00
Gold Bar	1.70	1.65	1.70
Bullfrog Mining	.55	.54	.55
Bullfrog National Bank	.68	.67	.67
Homestake Con	1.55	1.50	1.50
MANHATTAN STOCKS.			
Manhattan Con	1.08	1.05	1.07
Manhattan Dexter	.85	.80	.81
Jumping Jack	.50	.48	.49
Stray Dog	.70	.68	.69
Indian Camp	1.00	1.00	1.00

LONDON. *(By Cable.*)* Dec. 5.

Dolores, £1 12s. 6d., Stratton's Independence, £0 3s. 3d.; Camp Bird, £1 9s. 0d.; Esperanza, £2 10s. 0d.; Tomboy, £1 12s. 6d.; El Oro, £1 7s. 6d.; Oroville, £1 1s. 0d.; Somera, £0 6s. 3d.; Utah Apex, £1 11s. 3d.; Arizona Copper, pref., £3 12s. 6d.; Ariz. Copper, def., £3 10s. 6d.

SAN FRANCISCO Nov. 28.

Name of Company.	High.	Low.	Clg.	Sales.
COMSTOCK STOCKS.				
Belcher	.43	.31	.36	2 900
Best & Belcher	1.35	1.00	1.35	1,000
Caledonia	.69	.45	.62	8.780
Challar	.22	.17	.17	2,200
Con. Cal. & Va	1.40	1.10	1.35	6,500
Crown Point	.25	.18	.25	3,200
Gould & Curry	.37	.18	.30	4,800
Hale & Norcross	1.15	1.05	1.05	1,400
Mexican	1.20	1.00	1.10	7,600
Ophir	3.05	2.75	2.80	2,350
Overman	.17	.13	.16	1,200
Potosi	.26	.19	.24	4,300
Savage	1.35	1.05	1.20	4,300
Sierra Nevada	1.10	.80	1.00	6,100
Yellow Jacket	1.15	.73	1.00	9,100
TONOPAH STOCKS.				
Belmont	6.50	6.25	6.37	1,600
Golden Anchor	.64	.47	.60	13,800
Jim Butler	1.52	1.42	1.47	40,050
McNamara	.80	.79	.80	14 300
Midway	2.60	2.30	2.40	4,000
North Star	.48	.45	.47	21,200
West End	2.37	2.25	2.25	10,095
GOLDFIELD STOCKS.				
Atlanta	1.02	.77	.90	84,700
Columbia Mt	1.40	.95	1.25	60,750
Comb. Frac	6.12	5.00	5.12	15.600
Diamondfi'd B.B. Con.	.70	.56	.70	156 596
Florence				
Frances-Mohawk	1.30	.95	1.00	4,500
Goldfield Mining	2.40	1.90	2.20	57,900
Jumbo	4.50	4.02	4.05	19,250
Kendall	.80	.70	.75	13,500
Laguna	1.95	1.65	1.75	16,200
Mohawk	17.00	16.00	16.50	3,700
Red Top	4.37	4.00	4.00	34.367
Silver Pick	2.30	1.85	2.15	70,225
Sandstorm	.95	.83	.89	10,800
BULLFROG STOCKS.				
Bullfrog Mining	.62	.53	.53	29.600
Bullfrog Nat'l Bank	.71	.62	.65	29,350
Gold Bar	1.85	1.65	1.72	14,650
Homestake Con	1.60	1.45	1.52	11 000
Original	.27	.21	.27	63,738
Tramps Con	2.32	2.10	2.10	7,457
MANHATTAN STOCKS.				
Indian Camp	1.15	1.05	1.15	56,000
Jumping Jack	.55	.51	.55	50 875
Manhattan Con	1.10	1.00	1.10	3,700
Manhattan Dexter	.70	.62	.69	73.300
Stray Dog	.78	.71	.73	169,800

Assessments

Company.	Delinq.	Sale.	Amt.
Belcher, Nev	Dec. 5	Dec. 27	$0.10
Challenge Con	Nov. 27	Dec. 18	0.10
Con. New York	Nov. 22	Dec. 12	0.05
Con. St. Gothard, Cal.	Nov. 10	Dec. 10	0.10
Deadwood, Cal	Dec. 15	Jan. 3	0.05
Douglas, Idaho	Nov. 20	Dec. 10	0.005
Gould & Curry, Nev	Dec. 10	Dec. 31	0.10
Great Ironclad, Cal	Dec. 24	Jan. 15	0.03
Jenny Lind, Cal	Dec. 10	Dec. 26	0.04
Kentuck, Nev	Nov. 28	Dec. 18	0.05
Lyon, Utah	Dec. 10	Jan. 2	0.01
Nephi, Utah	Nov. 30	Dec. 29	0.005
Savage, Nev	Nov. 26	Dec. 17	0.10
Sierra Nevada	Nov. 27	Dec. 17	0.10
Star Con., Utah	Dec. 20	Jan. 9	0.03
Susannah, Utah	Dec. 21	Jan. 10	0.00½
Sweetwater, Utah	Dec. 24	Jan. 2	0.00½
Tule Belle, Cal	Dec. 3	Dec. 31	0.02

New Dividends

Company.	Payable.	Rate.	Amt.
Am. Smelters' Sec., pfd. A	Dec. 1	$1.50	$255,000
Am. Smelters' Sec., pfd. B	Dec. 1	1.25	375,000
Calumet & Arizona	Dec. 20	4.00	800,000
Con. Mercur	Dec. 19	0.02½	25.000
Copper Range Con	Dec. 22	2.00	767,562
Federal Mg. & Sm	Dec. 15	5.00	300,000
Federal Mg. & Sm., pfd	Dec. 15	1.75	210,000
Frances-Mohawk, Nev		1.10	91 000
General Chemical, pfd	Jan. 2	1.50	150,000
Gold Dollar Con, Colo	Dec. 15	0.00½	
Iron Silver, Colo	Jan. 1	0.20	100,000
National Lead, pfd	Dec. 15	1.75	268,820
North Butte		2.00	800,000
Parrot, Mont	Dec. 12	0.25	57,462
Quincy, Mich	Dec. 22	2.50	250,000
Red Metal	Dec. 1	4.00	
Republic Iron & Steel, pfd.	Jan. 2	3.75	765,634
Silver Queen, Cobalt	Dec.	0.01	10,000
Shannon Copper	Dec. 20	0.50	150,000
Standard Oil	Dec. 15	10.00	9,700,000
Utah, Fish Springs	Nov. 15	0.05	5,000
U. S. Red. & Refining, pfd.	Jan. 1	1.50	59,287
U. S. Steel, com	Dec. 31	0.50	2,541,512
U. S. Steel, pfd	Nov. 30	1.75	6,304,919
Wasp No. 2, S. Dak	Dec. 10	0.01	